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Angelini (A.), Chevrel (J.), Gaumont (R.) & Grison (P.). **Observations faites au cours du traitement aérien d'un verger contre l'hyponomeute.** —*Parasitica* **6** no. 3 pp. 81–87, 5 refs. Gembloux, 1950.

Cider-apple orchards near Falaise, in Normandy, were heavily infested by *Hyponomeuta padellus malinellus* Zell. in 1949, even where winter control measures had been applied. Since the treatments used on dessert apples are not economically practicable for cider apples, dusts applied from an aeroplane were tested in two orchards. Dusts of 5 per cent. DDT and 10 per cent. BHC were applied at about 25 lb. per acre on 13th June, when the larvae were seeking pupation sites and were therefore exposed, though less so than at the early stage in which they migrate from the leaf mines to feed in webs. The weather was warm and sunny during treatment and for several days afterwards, but the operation was hampered by the presence of screen trees round the orchards and of some tall ones within them. The quantity of dust to reach the leaves was measured by means of dishes set at various points on three test trees in each orchard, from which it appeared that a very small proportion of the dust applied was deposited on them. From observations on the larvae that fell from the test trees on the day of application and the two following days and on the subsequent fate in the laboratory of the larvae still on the trees on the third day after treatment, it is concluded that DDT gave about 80 per cent. mortality and BHC less than 10 per cent. Both dusts also killed other insects, including *Anthonomus pomorum* (L.) and other weevils. The dusts were shown to be incapable of penetrating the larval webs. The irregularity of distribution of the dust and the small proportion that reaches the foliage are important disadvantages in this method of application.

Shaposhnikov (G. Kh.). **The Aphids (Aphidoidea) occurring on Fruit Trees in the southern Crimea.** [*In Russian.*]—*Trud. vsesoyuz. ent. Obshch.* **43** pp. 7–36, 6 figs., 30 refs. Moscow, 1951.

A list is given of 28 species of Aphids that infest apple, quince, pear, cherry and *Prunus* (*Cerasus*) *mahaleb* in the southern Crimea, showing the synonymy, localities in which they were observed and degree of damage, and arranged according to the tree attacked, followed by keys for the identification of these and five other species that might occur on fruit trees there. The first key is based on characters of the living Aphids, their habits and the symptoms caused, and permits identification in the orchard or on leaves or twigs in the laboratory, and the second is based on the morphology of prepared specimens (parthenogenetic alates and apterae). The remainder of the paper consists of descriptions of the diagnostic characters of the genus *Anuraphis* and the morphology of various forms of the four species of it observed, *A. subterranea* (Wlk.), *A. farfarae* (Koch), *A. pyri-laseri* Shaposh. and *A. catonii* H.R.L., all of which overwinter on pear, a key to them, observations on their bionomics, and reviews of their distribution with special reference to the Soviet Union.

A. subterranea migrates from pear to Umbelliferae, including parsnip (*Pastinaca sativa*) and *Heracleum* spp., and was found on these plants near the orchards. Examples transferred in July from *P. pimpinellifolia* to carrot and then to *Libanotis* sp. and from *P. umbrosa* to *Pimpinella taurica* fed and reproduced, but the colonies died out in 4–8 days. *A. farfarae* prefers wild or semi-cultivated soft-fruited pears, and Mordvilko's observations that it migrates to *Tussilago farfara* was confirmed. *A. pyri-laseri* migrates to *Laser trilobum*. In 1949, the fundatrices began to reproduce on pear on 2nd May, the first winged migrants appeared on *L. trilobum* on 14th May, and subsequent generations were reared on that plant in the

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laboratory. This Aphid was also observed in the field on *Hippomarathrum crispum*, *Laserpitium hispidum* and (once only) *Torilis*. Apterae transferred to carrot reproduced, but the colony soon died out. *A. catonii*, which was not previously known to overwinter on pear, migrates from it to *Pimpinella saxifraga*. In 1949, the fundatrices on pear began to reproduce on 2nd May and winged migrants appeared in numbers between 13th and 19th May. The fundatrices and their progeny were observed in folded leaves, like other species of the genus, but it was not known whether the folding was due to them or whether they migrate to already folded leaves. They were also observed feeding openly on petioles, usually at the base, peduncles and the lower surfaces of leaves. In laboratory experiments, winged migrants from pear established themselves and reproduced on *Pimpinella peregrina*, but not on *Pastinaca* sp., and further generations were reared.

MATTHÉE (J. J.). **The Structure and Physiology of the Egg of** *Locustana pardalina* **(Walk.).**—*Sci. Bull. Dep. Agric. S. Afr.* no. 316, [1 +] 83 pp., 19 figs., 3½ pp. refs. Pretoria, 1951.

The following is almost entirely based on the author's summary and discussion of this account of investigations on the structure and physiology of the egg of *Locustana pardalina* (Wlk.), a locust of importance in South Africa. It was found that both diapausing and non-diapausing eggs are laid, sometimes in the same egg-pod, and that older females appear to lay more diapause eggs than young ones. Females in phase *solitaria* laid only diapause eggs, whereas those in phases *transiens congregans* and *gregaria* laid a high percentage of non-diapause eggs; hoppers that hatched from non-diapause eggs exhibited *gregaria* characters. Diapause eggs therefore appear to be associated with phase *solitaria* and non-diapause eggs with phase *gregaria*. Locusts in phase *gregaria* are known to be more active than those in phase *solitaria* and to show marked physiological differences [*cf. R.A.E.*, A **24** 229, 312; **34** 47] that may exert a pronounced effect on their eggs. The higher proportion of diapause eggs laid by older females is attributed partly to their slower rate of metabolism and partly to the reduced activity characteristic of *gregaria* females that have been confined in cages for some time, the behaviour of which approaches that of *solitaria* females. E. Slifer reports, however, the development by selective breeding of two strains in *Melanoplus differentialis* (Thos.), of which one produced only diapause eggs and the other only non-diapause eggs; the type of egg appeared to be determined by a genetic factor.

Apart from the occurrence of true diapause eggs, a dormancy due to lack of sufficient moisture is recognised in non-diapause eggs and in diapause eggs after the elimination of diapause. It is usually in this condition that the eggs remain in dry soil unharmed for many months. Dormant eggs that were allowed to absorb water until just turgid and were then kept in a dry atmosphere were found to have a higher moisture content when their rate of evaporation had fallen to normal eight days later than before they were moistened. As a result of this ability to restore the moisture content, rainfall below the minimum for hatching [**27** 393] may extend the survival period of the eggs. Light showers occurring every few months therefore have an important effect on the viability of eggs in drought-stricken areas. Theoretically, the eggs could thus be protected from destruction by desiccation for several years, provided that precipitation of the order of 0·1 inch occurs before the moisture content of the eggs falls to about 40 per cent., which appears to be the lower limit for viability. The ability of the eggs to increase their moisture content without hatching may help to explain the sudden appearance of large hopper bands after good rain in areas where no adult swarms have occurred for several years,

but where occasional light rain has fallen. A further factor is the continuous presence during the swarm-free period of solitary adults, which multiply so rapidly on the return of favourable conditions after a severe drought as to suggest that eggs of several generations have accumulated without hatching. Since a few of the diapause eggs laid by *solitaria* females hatch if enough rain falls after a few months of drought and each female lays an average of 4–5 pods at intervals of seven days [**27** 393], it is possible, notably when high rainfall in spring and early summer is followed by drought, for eggs of the first pod to hatch and give rise to adults that oviposit before the other eggs of the first pod and those of the subsequent ones hatch. By the spring, most of the eggs will be ready to hatch after the first good rain.

When they are laid, the eggs are enveloped only by the chorion, on the inner side of which is a primary wax layer comparable with that of the eggs of *Rhodnius prolixus* Stål [**37** 110]. Two secondary egg membranes are later secreted by the serosal cells, and at 35°C. [95°F.] these are laid down 2–3 and 4–6 days after oviposition. At about the time that the second one, which contains pore canals, is completed, a secondary wax layer is deposited at the interface between them. In the hydropyle area [**33** 386] at the posterior pole of the eggs, both the secondary membranes are of a specialised nature, are traversed by pore canals and there is no secondary wax layer. A thin layer of a proteinaceous material prevents unnecessary evaporation of water from the hydropyle, especially at relative humidities below 20 per cent., which frequently occur in the natural habitat. The primary wax layer effectively waterproofs fresh-laid eggs, which dried out completely when this layer was dissolved by immersion in chloroform. Immersion of eggs 4–6 days old in chloroform did not destroy their resistance to desiccation, conferred by the secondary wax layer which has by then been secreted.

Candura (G. S.). **Reperti sulla** *Sitotroga cerealella* **Oliv. nell'Italia settentrionale e su altre tignole dei viveri.** [Notes on *S. cerealella* in northern Italy and on other Moths infesting stored Foodstuffs.]—*Boll. Zool. agr. Bachic.* **16** fasc. 3 pp. 99–146, 6 figs., 1 fldg. table, 11 refs. Turin, 1950.

All stages of *Sitotroga cerealella* (Ol.) are described, and a detailed account is given of studies on its bionomics made mainly at Bolzano, in northern Italy, in 1932–44 to supplement those already recorded from the south of that country [*cf. R.A.E.*, A **15** 164; **32** 179]. The moth was reared on various products in the laboratory, and the order of decreasing preference among the more important was barley, wheat, canary-grass seed (*Bhalaris canariensis*), rye, buckwheat, maize, sorghum, oats and dried chestnuts. The first adults emerged between 8th and 15th April, about a month earlier than in southern Italy. Pairing and oviposition occurred within about a day, and the oviposition period usually lasted three days, though it was sometimes as long as five. The eggs were laid in groups of 20–30 or even 50 on the grains. Feeding was not essential for oviposition, but females that fed on honey and water lived longer and laid more eggs than those that did not. Without feeding, normal length of adult life ranged from 6–9 days in July–August to 2–3 weeks in October–November.

Observations were made over several generations on the rate of reproduction; 25 of the females in the 100 pairs observed in 1936–37 laid no eggs, though a few of them had paired, but this was due in part to a disease that broke out in June 1937. Larvae hatched from 65 of the 75 egg-batches obtained and were provided with various foods, but only 29 of the

batches gave rise to adults. The numbers of eggs laid by the females from which these batches were derived ranged from 40 to 160, with an average of 94·2, as compared with one of 153 in southern Italy. The average numbers of eggs laid per female decreased as the season progressed from 148 in May to 46 in October [*cf.* **32** 180]. In parallel studies, 23·2 and 9·25 per cent., respectively, of pairs of *Plodia* [*interpunctella* (Hb.)] and *Tinea granella* (L.) gave rise to adult progeny [**27** 173]. Fecundity in all three species decreased from the first to the last adults emerging in each generation and from the first to the last generation of the year.

Investigations in southern and northern Italy showed that about 97 per cent. of the fertilised eggs of *S. cerealella* hatched but that only 6 per cent. gave rise to adults. Larval mortality ranged from 30 per cent. in fresh grains to 90–100 per cent. in very dry ones. Mortality in the pupal stage did not usually exceed 5 per cent., and mortality of adults before pairing was normally about 2 per cent.

The duration of the egg stage ranged from four days in July to 21 in September–October in the north and from four days in August to 13 and 14 in October–November and May, respectively, in the south. The duration of the larval and pupal stages together varied not only with temperature but also with the condition of the foodstuff infested, being longest in very dry materials. The shortest periods observed were 29 days in barley in the south and 26 in soft wheat in the north.

The length of the complete life-cycle in the north ranged from 28 days in July–August, in newly harvested soft wheat, to 367 days in very dry barley. The numbers of generations a year varied with the food and its condition, and there were usually 3–4 in the south, though the number frequently ranged from two in oats, maize and other less favoured grains to five in barley and soft wheat [**15** 164], and averaged 2–3 in the north, though there were occasionally four on barley. Peaks of adult emergence in 1935–37 occurred in mid-April, late May, mid-July and mid-August, the first two being due to adults from overwintering larvae, and the first to those from larvae that completed their feeding in the preceding autumn. No adults emerged between December and March. The two sexes were about equal in numbers on preferred foods, but males greatly predominated on unfavourable ones

S. cerealella also infests grain in the field in Italy. The eggs are laid in groups of 5–6 between the glumes and successive generations develop in the field or in stored grain, breeding continuing in the field after harvest in fallen ears. The larvae overwinter in the sown seeds, pupate at the end of April or the beginning of May and give rise to adults 15–20 days later.

In further experiments on the protection of stored grain by dusting with fossil farina [**32** 180], it was found that 0·2 per cent. of this material gives excellent protection against all the common grain pests, kills any larvae already present, and retains its effectiveness indefinitely, provided that it is kept dry. A similar dust of pumice also gave considerable protection, but was less effective in controlling existing infestation.

Alessandrini (M.) & Saccà (G.). **Ricerche sulla mosca olearia** (*Dacus oleae* **Rossi) in Provincia di Latina.** [Investigations on *D. oleae* (Gmel.) in the Province of Latina.]—*R.C. Ist, sup. Sanità* **16** pt. 1–3 pp. 193–203, 6 graphs (3 fldg.), 12 refs. Rome, 1953. (With Summaries in French, English and German.)

Observations on the bionomics of *Dacus oleae* (Gmel.) in the Province of Latina, near Rome, in 1950–51 showed that infestation began at the end of June, when a few punctures were found on immature olives of early varieties, and rose to a peak in October, when 90 per cent. of the olives

were infested in some areas. The attack was most severe in low-lying places near the sea, and many groves on higher ground were only lightly infested. Adults were taken all through the winter, except for very brief periods, in bait-pans containing ammonium sulphate hung in the trees, but although a definite increase in numbers was evident in April, none was taken between 22nd May and 2nd July. In observations on adult emergence, larvae obtained in November–February from olives about to be pressed were allowed to pupate in dry sand, and the containers were then placed in the open and protected from rain. Most of the flies emerged in the second half of the winter, and all had done so by the end of April. When the puparia were exposed to a temperature of 2°C. [35·6°F.] for 26 days, 30 per cent. of them gave rise to adults after transfer to warmer conditions. In studies on adult survival, about 1,000 flies that emerged on 19th February were kept at laboratory temperature and provided with honey; 190 survived until June, and four (one male and three females) until July. It is concluded that the adults of the last generation of the year emerge in late winter or early spring and oviposit in the young fruits of the next season.

In laboratory experiments on the sensitivity of the flies to deposits of chlorinated insecticides, adults were confined in gauze bags on branches that had been copiously sprayed with suspensions of 5 per cent. DDT or chlordane. Mortality was complete in 5 and 6 hours, respectively. Chlordane applied at 2 gm. per sq. metre [about 0·06 oz. per sq. yard] to the walls of a glass cage gave complete mortality in two hours of adults released in it, and DDT applied at the same rate killed all the flies, except one that was still alive after 24 hours, in 2¼ hours. After exposure for one hour in Erlenmeyer flasks containing deposits of 0·01–0·5 gm. DDT or chlordane per sq. metre, adults were removed to cages containing food, and mortality was recorded after 24 hours. The mortality percentages for DDT and (in brackets) chlordane were about 45–60 (70–75), 80 (80), 95 (85–90) and 100 (100) for deposits of 0·01, 0·02, 0·05 and 0·1–0·5 gm. per sq. metre, respectively.

It is pointed out that it is not possible on olive to obtain deposits of more than 0·06–0·12 gm. insecticide per sq. metre of leaf surface, either from dusts or sprays, and that as this is apparently far below the amount necessary for effective control, it accounts for the often reported failure in the field of materials that give good results in the laboratory. Weathering of the insecticides further reduces their effectiveness. The risk that *D. oleae* may acquire resistance to insecticides if they are used extensively and the difficulties of obtaining adequate coverage in spraying are discussed, and recommendations are made for the control of pupae hibernating in pressing establishments.

Santoro (R.). **Ricerche con prodotti organico-sintetici in rapporto a *Dacus oleae*, a entomoparassiti ed insetti varii eseguite in Ascea (Salerno) nel 1951.** [Investigations with synthetic organic Products in Reference to *D. oleae*, its Parasites and other Insects, carried out in Ascea (Salerno) in 1951.]—*Ann. Sper. agr.* (N.S.) **7** no. 1 pp. 31–62, 11 refs. Rome, 1953. (With a Summary in English.)

The experiments described were supplementary to investigations on the control of *Dacus oleae* (Gmel.) on olive near Salerno in 1951 [*cf. R.A.E.*, A **41** 393] and a continuation of similar work in 1950 [**41** 109]. In a further test on the effect of sprays on the whole insect fauna of olive, single trees were sprayed with 50 per cent. colloidal DDT paste or an emulsion concentrate containing 25 per cent. each of DDT and BHC, both at 4 lb. per 10 gals., or with 0·5 per cent. of a wettable powder containing 20 per cent. parathion, on 6th September and 7th and 31st October, and the first two

also on 25th July and 3rd August, respectively. Sheets were spread beneath these and an untreated tree, and counts were made at intervals of the insects collected from them. The results, which are shown in detail in tables, confirmed those of 1950 [**41** 109], parathion giving the highest and DDT alone the least mortality of *D. oleae*, though few adults were found under any of the trees until after the treatment on 7th October. The parathion maintained its effectiveness for 10–12 days.

The fruit crops on the four trees were about equal in mid-September. That on trees treated with colloidal DDT or the mixture of DDT and BHC was largely undamaged and developed normally, ripening in December. Many of the fruits on the tree sprayed with parathion showed evidence of oviposition, but about 70 per cent. of these developed normally, the larvae dying soon after hatching, though the remainder fell prematurely in October and November. Almost all the fruits on the control tree were infested.

Studies were also made on the effect of the parathion powder on the larvae and pupae [*cf.* **41** 347, etc.]. On 28th October, groups of 40 pupae were immersed for 30 seconds in suspensions of 0·4, 0·5 or 0·6 per cent. of the powder and were then dried and kept in jars containing damp sand covered by a thin layer of soil. By 16th November, 39 adults had emerged from the control group, 6 from that treated at 0·4 per cent. and none from the others. On 2nd November, olives containing larvae in various stages of development were similarly immersed. Examination on 13th November showed that 88·6, 91·2 and 92·6 per cent., respectively, of the fruits in the three groups contained dead larvae, 3·33, 1·33 and 1·33 per cent. living pupae and 8, 7·33 and 6 per cent. dead pupae, as compared with 52 and 46·6 per cent. with living larvae and pupae, respectively, in the controls. When small branches bearing infested olives on a tree were immersed for 30 seconds in a 0·5 per cent. suspension of the powder and enclosed in gauze bags, examination of the olives after 2, 5 and 13 days showed that they contained only eggs or dead larvae. No effect on the larvae was observed when cut branches bearing infested olives were kept for 10 days with the lower part in a 5 per cent. suspension. In a further test in which infested olives were dipped rapidly in a 0·5 per cent. suspension of the powder, mortality of the larvae after three days was 92·6 per cent., as compared with none in the controls. The larvae that were not killed were found to be deep in the fruits. When infested olives were sprayed from above and below with the 0·5 per cent. suspension on 21st November, the percentage mortality of the larvae after 5 days was 88·6, as compared with none in the controls.

Counts of the adults taken in 1951 in bait-pans containing diammonium phosphate showed a preponderance of males up to September, about equal numbers of males and females during September, and a predominance of females from October to November; the proportions were again about equal by the end of December.

Romano (E.). **Evaporazione, alla luce, degli insetticidi clorurati organici. Nota III.** [The Vaporisation of chlorinated organic Insecticides exposed to Light. Note 3.]—*Ann. Sper. agr.* (N.S.) **7** no. 1 pp. 347–350, 1 graph, 2 refs. Rome, 1953. (With a Summary in English.)

When deposits of almost pure γ BHC and technical BHC containing 14 per cent. γ isomer from ethyl-alcohol solutions were exposed to light in the same manner as the insecticides previously tested [*R.A.E.*, A **41** 110], the percentage losses in weight were 36·5 and 47·5, respectively, after two days, 63·5 and 61·5 after four, 80 and 69·5 after six, and 91·5 and 75 after eight. When the γ BHC was crystallised from ethyl ether, which evaporates more rapidly than alcohol, the losses during the ensuing three

days were greater, since the crystals were smaller and a larger total surface area was exposed.

Nikol'skaya (M. N.). **Representatives of the Family Signiphoridae (Hymenoptera, Chalcidoidea) in the Fauna of the USSR.** [*In Russian.*]—*Dokl. Akad. Nauk SSSR* (N.S.) **75** no. 2 pp. 319–321, 14 figs., 7 refs. Moscow, 1950.

The author reviews the previous classification of the Signiphorids and describes four species as examples of the four genera recognised by her [but *cf. R.A.E.*, A **42** 45]. These are *Thysanus ater* Wlk., *Signiphora merceti* Malen., *Xana kurdjumovi*, n.n. (*nigra* Kurd. [**5** 301]), and *Signiphorina mala*, gen. et sp.n. The particular characters considered of generic value are not given, but *Signiphora elongata* (Gir.) is referred to *Signiphorina*. It is considered that *Xana* is an earlier name for *Matritia* and that *Signiphora nigra* Ashm. is referable to it and thus preoccupies *X. nigra* Kurd. The Signiphorids have been recorded as parasites of Coccids, Psyllids and Aleurodids, but biological studies have shown that some of them are secondary parasites. Thus, the chief host of *Signiphorina mala*, which is widely distributed in the Crimea, Caucasus and Central Asia, is *Pseudaphycus malinus* Gah., an Encyrtid introduced from North America for the control of *Pseudococcus comstocki* (Kuw.). It is also recorded as having been bred from puparia of an indigenous species of *Leucopis* that attacks *P. comstocki*, and from *Planococcus* (*P.*) *citri* (Risso) and *Lepidosaphes ulmi* (L.). *X. kurdjumovi* is a parasite, possibly secondary, of *Pseudococcus comstocki* and *Mediococcus circumscriptus* Kirichenko in the Soviet Union [*cf.* also **3** 308; **5** 301].

Page (A. B. P.), Blackith (R. E.), Brown (W. B.) & Heuser (S. G.). **Descriptive Terms for Vacuum Fumigation.**—*Chem. & Ind.* 1953 pp. 353–354, 1 ref. London, 1953.

The authors propose the terms "sustained-vacuum fumigation", "vacuum fumigation with atmospheric pressure restored immediately after dosage" and "vacuum fumigation with simultaneous admission of air and fumigant" for the three standard methods of fumigation under reduced pressure [*R.A.E.*, A **41** 349] and "vacuum fumigation with atmospheric pressure restored after a period" for a recently developed method [**41** 350] in which air is admitted after a period of treatment to raise the pressure to that of the atmosphere. With regard to the process of "air-washing" to remove much of the fumigant prior to opening the chamber for unloading, they state that there need be no ambiguity where phrases such as "two air-washes" are used if it is accepted that each air-wash consists of a reduction in pressure from that of the atmosphere followed by restoration to it.

El Nahal (A. K. M.). **Responses of Pests to Fumigation. III.—The Fumigation of Wheat containing** *Calandra* **spp. (Curculionidae) with three Fumigants, under reduced Pressure.**—*Bull. ent. Res.* **44** pt. 4 pp. 641–650, 4 figs., 12 refs. London, 1953. **IV.—The Responses of** *Calandra* **spp. to reduced Pressures.**—*T.c.* pp. 651–656, 11 refs.

The following is largely the author's summary of the first of these papers, which are parts of a series [*cf. R.A.E.*, A **41** 313]. Wheat of three moisture contents in sacks was fumigated with ethylene oxide, methyl bromide and hydrogen cyanide. Estimates of the concentration of fumigant in representative samples and observations on the mortality of adults of *Calandra granaria* (L.) and *C. oryzae* (L.) were used to follow the changing

distribution of the fumigant when it was applied at atmospheric pressure, with sustained vacuum, or in vacuum fumigation with simultaneous admission of air and fumigant [*cf.* preceding abstract]. As these various factors were altered, in a multifactorial experiment, the changes in the fumigant distribution were recorded and analysed statistically. Changes in the mortality of both species of *Calandra*, either buried in a 1-cwt. sack of wheat or in the free space surrounding it, were estimated so that that part of the changes that was associated with the altered fumigant distribution was segregated by a covariance analysis and the remainder formed an estimate of the direct influence of the experimental conditions on the susceptibility of the weevils to the fumigants. When either ethylene oxide or methyl bromide was used, vacuum fumigation with simultaneous admission of air and fumigant gave results, in terms of the control of *Calandra* spp., that were almost indistinguishable from those obtained at atmospheric pressure under comparable conditions. With HCN, atmospheric fumigation was superior, quite apart from the capital expense and other practical disadvantages of fumigations at reduced pressures. In fumigation with the more strongly sorbed ethylene oxide and HCN, sustained-vacuum fumigation showed a marked improvement over the other two methods. With the weakly sorbed methyl bromide, this advantage was appreciable only at low doses (6 mg. per litre) and disappeared at a nominal dosage of 14 mg. per litre. Damp grain generally diminished the advantages of sustained-vacuum fumigation to some extent. Apart from the total concentration-time product, the shape of the curve representing the increase of concentration with time seemed to be important in insect mortality, thus constituting a further failure of Haber's rule for fumigant toxicity [**23** 121; **41** 313]. High concentrations applied for short periods were more toxic than low concentrations applied over a longer period. When methyl bromide or HCN was applied in a way that admitted small sublethal doses to the grain before the lethal dose penetrated, the resistance of the insects was much enhanced, and the term "protective stupefaction" is provisionally used for this phenomenon [*cf.* **31** 100, etc.]. Although sufficiently marked to be of economic importance in the case of methyl bromide, protective stupefaction was most serious when HCN was the fumigant, the reduction in response due to stupefaction then being almost five times as great as the reduction due to the lowered concentration-time product resulting from sorption.

The following is virtually the author's summary of the second paper. The direct action of reduced pressures, in the absence of any fumigant, on *C. oryzae* and *C. granaria* [*cf.* **41** 313] was investigated in glass chambers of about 1 litre capacity. *C. oryzae* is sufficiently sensitive to make the direct effect of reducing the pressure within the range 2 to 10 cm. mercury of some practical importance, but *C. granaria* is more resistant. Mortality of both species increases for exposure periods of up to 8 hours and for increased temperatures from 20 to 28°C. [68–82·4°F.]. A large part of the observed mortality must be associated with enhanced water-loss from the insects at reduced pressures, as little response occurs when the atmosphere is kept saturated with water-vapour.

WAY (M. J.). **Studies on *Theraptus* sp. (Coreidae); the Cause of the Gumming Disease of Coconuts in East Africa.**—*Bull. ent. Res.* **44** pt. 4 pp. 657–667, 1 pl., 4 graphs, 8 refs. London, 1953. **The Relationship between certain Ant Species with particular Reference to Biological Control of the Coreid, *Theraptus* sp.**—*T.c.* pp. 669–691, 1 pl., 8 figs., 12 refs.

Gumming and premature nutfall of coconut is widespread in coastal districts of Kenya and Tanganyika and in the islands of Zanzibar, Pemba

and Mafia. It was formerly attributed to unfavourable soil conditions, but is now known to be due to one or more undescribed Coreids collectively referred to by the author as *Theraptus* sp. The first paper contains an account of the bionomics, local distribution and economic importance of these bugs, which have similar habits, based chiefly on investigations in Zanzibar in 1950–51.

During June–October, the mean durations of the egg and nymphal stages in an outdoor insectary shaded from the sun, where the mean temperature was 24·6°C. [76·28°F.], were 8·5 and 32·5 days, respectively, and adult males and females survived for averages of 83·5 and 53 days. Breeding occurred continuously, and there are probably over nine generations a year, development being more rapid in the hot season. Eggs were laid singly, and four females deposited 40–122 each. Attack was confined to the spadix and did not affect the vigour of the trees. Feeding sometimes occurs at the base of the male flowers and on the main stems and branches of newly opened spadices, but the main damage is due to feeding by the older nymphs and adults through the bracts on the female flowers and young nuts, which are preferred; the punctures cause the formation of sunken necrotic areas on the nuts, apparently owing to the injection of toxic saliva, and single punctures cause the loss of flowers and nuts up to eight weeks old and premature fall of nuts up to 12 weeks. Nuts damaged when 10–16 weeks old sometimes mature, but are undersized and often distorted by lesions from which a gummy material exudes, and damage to fully grown nuts, 5–6 months old, is unimportant. In the insectary, nymphs and adults fed and developed normally on nuts 6–24 weeks old and showed no preference for those of any particular age. Each Coreid makes about 200 feeding punctures during its life, and a very low population may therefore cause serious injury. Even in severely damaged plantations, the maximum number of bugs per palm rarely exceeded two; all the flowers and nuts on many palms were destroyed before they were eight weeks old, however, and it was evident that much migration between palms was taking place. In less severely damaged plantations, some nuts had reached a more resistant age before being attacked, and the palms could therefore support a higher population. Except where *Oecophylla longinoda* (Latr.), a predacious ant that attacks *Theraptus*, was common, damage was most severe in almost pure closely planted stands. During 1951, palms colonised by *O. longinoda* bore an average of 72·3 nuts each, whereas the average yield from neighbouring palms from which the ant was absent was 13·4. An attempt to estimate the crop loss due to *Theraptus* was made by dusting palms in a plantation from which *O. longinoda* was absent with 0·4 per cent. γ BHC at fortnightly intervals for 6½ months; the yield per spadix was increased from 0·5 to 10 nuts, but the nuts on the treated trees became heavily infested by *Hemiberlesia lataniae* (Sign.), which was otherwise not common. Between December 1950 and December 1951, there was a natural fall of 74·8 per cent. of nuts 5–10 weeks old on palms on which *Theraptus* was controlled by *O. longinoda*, as compared with a fall of 94 per cent. on neighbouring infested palms. In both Zanzibar and Tanganyika, relative injury by *Theraptus* increased with the number of flowers per spadix, the yield from infested palms at first remaining fairly constant and subsequently declining as the number of female flowers per spadix increased, whereas the yield from undamaged palms increased directly with the number of flowers, though the ratio of nuts to flowers decreased. Of 122 spadices, each bearing 50 or more female flowers, on 12 infested palms, only 11 produced mature nuts, of which the average number per spadix was 0·14; when six of these palms were dusted with 0·4 per cent. γ BHC at weekly intervals, the yield of nuts per spadix rose to 17. Damage might be reduced by cultivating

varieties with relatively few flowers per spadix, and these are often preferred since the nuts are few and large, which facilitates gathering and processing. No observations were made on alternative food-plants in Zanzibar, but adults were reported damaging cacao pods in Pemba and nymphs were subsequently found on cacao in Zanzibar; *Theraptus* has also been reported breeding on and damaging guava and wild leguminous plants.

The second paper deals with the ants associated with *Theraptus* and their importance in its control, mainly from observations in Zanzibar. The predacious *O. longinoda* is locally abundant in all the coconut areas under consideration, and where it colonises 70 per cent. or more of the palms, damage by *Theraptus* is usually slight. In many areas, however, it has died out as a result of competition from *Pheidole punctulata* Mayr, *Anoplolepis longipes* (Jerd.) and *A. custodiens* (F. Sm.), none of which preys on *Theraptus*. *P. punctulata* is widely distributed and normally common in areas occupied by *O. longinoda* and also occurs with *A. longipes*, which was found only in Zanzibar, but is then relatively scarce. *A. custodiens* is locally abundant in Zanzibar and Tanganyika and also occurs in Mafia. The nesting habits of these three ants and their relation with *O. longinoda* and other insects are described. *O. longinoda* has been exterminated in the limited areas occupied by *Anoplolepis* spp., which, especially *A. custodiens*, occur in sandy soils with sparse ground vegetation. The low temperatures of soils shaded by thick ground vegetation may be unfavourable for them. *P. punctulata* and *O. longinoda* are both abundant in sites with thick ground vegetation, probably because this provides adequate food for *P. punctulata*, and the latter is therefore not forced to compete with *O. longinoda* in the crowns of the trees. The most satisfactory measure against *Theraptus* appears to be the encouragement of *O. longinoda*, and this will necessitate control of the other ants, possibly by encouraging thick ground vegetation or, where this is impracticable, by the use of insecticides. In a preliminary test in Zanzibar, emulsion sprays of 2 per cent. dieldrin or γ BHC applied to a band about 3 ft. wide round the trunks of mango trees worked by *A. custodiens* killed large numbers of the ants and kept the trees free for 75 and 45 days, respectively; 2 per cent. DDT was less effective.

Hynes (H. B. N.). **A comparative Study of Anti-locust Baits, with special Reference to Base Materials.**—*Bull. ent. Res.* **44** pt. 4 pp. 693–702, 16 refs. London, 1953.

Various materials were tested for use as carriers for sodium arsenite in wet baits for the control of *Schistocerca gregaria* (Forsk.) in Kenya and Somalia during the large-scale campaigns of 1942–46. Their acceptability was assessed by a technique in which the prepared baits (poisoned with 1·5–2 per cent. sodium arsenite) were laid over plots 1 sq. ft. in area in the path of hopper bands at a place where several broad even streams of hoppers could be seen at once, and the number of hoppers that stopped on each plot was counted at five-minute intervals through field-glasses. The results, which in general confirmed those of earlier investigators [*cf. R.A.E.*, A **24** 394; **28** 142; **34** 294], showed that the materials could be divided into five classes, which, in order of decreasing acceptability, comprised: maize meal and rice polishings; wheat bran; maize and rice brans, cottonseed husk, and coffee husk from which the flesh of the berry had not been removed prior to drying (buni husk); bagasse, sugar-cane trash, and sorghum and maize stalks; and husks of coffee, groundnuts and rice, maize cob, sawdust from *Podocarpus* wood, dom-nut residue [derived from nuts of *Hyphaene thebaica*], old buni husk and shea-seed cake [prepared from *Butyrospermum parkii*]. Heavy lignification appeared to detract from

acceptability, and the presence of starch to add to it. Limited tests with cottonseed husk, rice bran and bagasse as the carriers indicated that the addition of molasses increases the attractiveness of only the least acceptable materials unless it is used in very large quantities [*cf.* **27** 240; **34** 294]. Other tests showed that acceptability was not correlated with water-absorbing properties, that the rate of drying was dependent on the amount of water initially absorbed, and that the addition of salt or molasses, but not soda, delayed the rate of drying out, though molasses was effective only when large amounts were added.

Woodroffe (G. E.). **An ecological Study of the Insects and Mites in the Nests of certain Birds in Britain.**—*Bull. ent. Res.* **44** pt. 4 pp. 739–772, 3 pls., 2 figs., 15 refs. London, 1953.

An account is given of a survey of arthropods present in birds' nests that was made in England during 1950–51 partly to provide data from which the importance of nests as reservoirs of insects and mites that infest stored products or are troublesome in houses could be assessed. It includes lists of the species found, with some indication of their abundance and information on their importance, interrelationships and specificity, and discussions of the possible influence of the composition of the nest and the temperature and humidity within it on its fauna and of possible methods by which the nests are colonised. Rather similar work by S. Nordberg (1936) in Finland is summarised and discussed in the light of the results.

Tinea pellionella (L.) and *Attagenus pellio* (L.) were associated particularly with jackdaws, *Anthrenus verbasci* (L.) with sparrows, and *Dermestes lardarius* L., *Sitodrepa* (*Stegobium*) *panicea* (L.), *Lepisma saccharina* L., and Ptinids with pigeons. A common species in sparrows' nests was *T. columbariella* Wocke, which has probably been confused with *T. pellionella* and has been found attacking clothing in company with it in Britain, though the extent to which it is a clothes moth is not known. The commonest species of all was *Hofmannophila pseudospretella* (Stnt.), which is of some importance as a pest of stored cereals and clothing. *Tineola bisselliella* (Humm.) was rare.

Simmonds (F. J.). **Observations on the Biology and Mass-breeding of *Spalangia drosophilae* Ashm. (Hymenoptera, Spalangiidae), a Parasite of the Frit-fly, *Oscinella frit* (L.).**—*Bull. ent. Res.* **44** pt. 4 pp. 773–778, 4 refs. London, 1953.

Spalangia drosophilae Ashm., which parasitises *Oscinella frit* (L.) in Canada, was found to show promise for introduction into England against this Chloropid [*cf. R.A.E.*, A **41** 319, etc.], and a method of mass-rearing was developed for the purpose. As *O. frit* cannot easily be bred in the laboratory, an alternative host was sought. Puparia of *Musca domestica* L. were only occasionally attacked, but puparia of *Drosophila melanogaster* Mg. proved very suitable. *Drosophila* was reared on a medium consisting of mashed tomatos, maize meal, honey and water with the addition of a little yeast, and the puparia were transferred from the paper on which the larvae pupated to large jars into which adults of *Spalangia* were introduced. There was less than 3 per cent. mortality among the immature parasites, and at temperatures of 70, 75 and 83°F., the females completed their development in averages of 30·5, 25·73 and 17·2 days, respectively, and survived for further averages of 42·6, 41·5 and 20·9 days; males developed rather more quickly. Females comprised 38·5, 60·4 and 52 per cent. of the

adults reared at these temperatures, respectively, and 97·8, 88·3 and 35·6 per cent. of the larvae entered diapause [*cf.* **34** 295]. The average number of eggs deposited per female was about 111 at 70 and 83°F. and about 142 at 75°F. The females do not oviposit in all the hosts punctured by their ovipositors, but the wounds cause paralysis and cessation of development [*cf.* **32** 192] and therefore contribute to total mortality. Most eggs were deposited about a week after emergence, and the average number of hosts wounded but not parasitised remained fairly constant throughout the life of the female. Unfertilised eggs gave rise to males. The parasites paired readily under laboratory conditions, but a single mating on emergence did not ensure the fertilisation of eggs throughout the life of the female; evidence was obtained that the spermatozoa remain active for up to 15–17 days at 83 and 75°F. and for up to 34 days at 70°F. In the field, both males and females probably pair more than once.

Johnson (B.). **The injurious Effects of the hooked epidermal Hairs of French Beans** (*Phaseolus vulgaris* **L.**) **on** *Aphis craccivora* **Koch.**—*Bull. ent. Res.* **44** pt. 4 pp. 779–788, 6 figs., 12 refs. London, 1953.

The Aphids used in the experiments described originated from a female of *Aphis craccivora* Koch taken on cowpea in Sydney, New South Wales, in 1950 and were reared on cowpea and broad bean, which is liable to heavy infestation in the field. The following is largely the author's summary of the results. The small, hooked, epidermal hairs present on the petioles, stems and lower surfaces of the leaves of french bean have a harmful effect on colonies of *A. craccivora* [*cf.* also *R.A.E.*, A **38** 93, etc.]. They are most dense and therefore most injurious on the young shoots. The legs of the Aphids become impaled on the hooks, and the subsequent bleeding, starvation and exhaustion result in high mortality of nymphs, protracted development and reduced size, with associated decreased fecundity. On varieties on which the hairs are less dense, mortality was low among the Aphids, but it may be higher among their predators, which, owing to their greater activity, are more likely to come in contact with the hairs [*cf.* **35** 148].

Kerrich (G. J.). **Report on Encyrtidae associated with Mealybugs on Cacao in Trinidad, and on some other Species related thereto.**—*Bull. ent. Res.* **44** pt. 4 pp. 789–810, 25 figs., 19 refs. London, 1953.

This paper is concerned with the taxonomy of ten species of parasites and hyperparasites of mealybugs on cacao in Trinidad reared by T. W. Kirkpatrick in 1949–50 and of certain other species related to them. Those associated with the cacao mealybugs in Trinidad comprise the Encyrtids, *Leptomastix dactylopii* How. from *Planococcus* (*Pseudococcus*) *citri* (Risso) (also recorded from that mealybug on potato in Bermuda), *L. dispar* and *Apoanagyrus trinidadensis*, spp. n., from *Ferrisiana virgata* (Ckll.), *Neodiscodes kirkpatricki*, sp. n., from unidentified mealybugs, *Aenasius theobromae*, sp. n., from *Dysmicoccus* (*Pseudococcus*) *brevipes* (Ckll.), *Coccidoctonus trinidadensis* Crwf. from *L. dactylopii* on *Planococcus citri* and a Cecidomyiid predacious on the eggs of this mealybug, and *Achrysopophagus dactylopii* (How.), *A. scini* Dozier and *Gahaniella tertia*, sp. n., from *L. dactylopii* on *P. citri*, and the Signiphorid (Thysanid), *Thysanus colcoptratus*, sp. n., which is suspected of being a parasite of *G. tertia*. Descriptions are given of all but *C. trinidadensis*. The other parasites described include the Encyrtids, *Neodiscodes martinii* Comp. from

Pseudococcus njalensis Laing on cacao in the Gold Coast, *Planococcus citri* on wild olive in Eritrea and an unidentified mealybug in Kenya, and *N. lepelleyi*, sp. n., from *Planococcus* (*Pseudococcus*) *lilacinus* (Ckll.), and also possibly from *Scymnus* sp., in Ceylon, and the Signiphorids, *Thysanus frequentior*, sp. n., from pupae of *Paratheresia claripalpis* (Wulp) parasitising *Diatraea rosa* Heinr. on sugar-cane and maize and *D. lineolata* (Wlk.) on maize in Venezuela and also from *P. claripalpis* in Trinidad, and *T. zostericus*, sp. n., from pupae of *Metagonistylum minense* Tns. and *Leskiopalpus* (*Stomatodexia*) *diadema* (Wied.) in Brazil and an unidentified Tachinid parasite of *Castnia licoides* Boisd. in British Guiana. Keys are included to the species of *Neodiscodes* and *Apoanagyrus* and the tropical American species of *Leptomastix*, together with a couplet differentiating the females of *Aenasius theobromae* and *A. cariocus* Comp. for insertion in Compere's key to the species of *Aenasius* [*R.A.E.*, A **26** 212].

The author reviews previous ways in which the Signiphorids have been classified, including the recognition of the four genera *Thysanus*, *Signiphora*, *Xana* and *Signiphorina* by Nikol'skaya [**42** 39]. He points out that she does not enumerate the characters that she considers of generic value, that the name *Matritia* is earlier than *Xana* and should be adopted if the genera are identical, and that her reasons for referring *Signiphora nigra* Ashm. to *Xana* are not clear. He has attempted to apply the generic characters proposed by various authors to 11 species for which he has sufficient data, including the four described by Nikol'skaya and representatives of *Neosigniphora*, *Signiphorella* and *Matritia*, but finds that they occur in so many combinations that he considers it best to include all species of the family in the genus *Thysanus sens. lat.*

Pasfield (G.) & Greaves (T.). **The Control of Argentine Ants (*Iridomyrmex humilis* Mayr). Results of Investigations in N.S.W. August, 1950–October, 1951.**—*Agric. Gaz. N.S.W.* **62** pt. 12 pp. 634–639, 642, 6 refs. Sydney, 1951.

A survey made following the discovery of *Iridomyrmex humilis* (Mayr) in the metropolitan area of Sydney in April 1950 [*R.A.E.*, A **39** 326] showed that there were extensive infestations in three suburbs and smaller ones in two others, the total infested area occupying about one square mile in July. Comparative tests of the value of dusting with DDT and spraying with various insecticides were made in a residential area of one of the extensively infested suburbs, and an account is given of this work and of three attempts at eradication of isolated infestations.

The following is partly based on the authors' summary. A method of applying sprays to form a succession of barriers round houses, or within infested areas, in such a manner that the ants had to cross a barrier to reach food or a favoured nesting site was developed. The activity of the ants was measured by assessing the number of trails and the average number of ants per foot of trail in preferred situations round each residential block. The materials tested were a dust of 2 per cent. DDT and emulsified solutions of 1 or 2 per cent. DDT, 0·5 per cent. γ BHC, and 1 or 2 per cent. chlordane. All considerably reduced infestation. The spray of 2 per cent. chlordane was the best treatment [*cf.* **41** 255], and at rates of 9 gals. per block in late winter and 8 gals. in mid-spring, it gave complete control for 13 and 7 weeks, respectively; the 2 per cent. DDT spray at higher rates gave similar, though slightly inferior, control. A spray of 1 per cent. chlordane applied at 8¼ gals. in mid-spring gave complete control for two weeks. Sprays of 1 per cent. DDT and 0·5 per cent. γ BHC were inferior, and the DDT dust was much the least effective. A combined spray of 1 per cent.

chlordane and 1 per cent. DDT was as effective under wet summer conditions as 2 per cent. chlordane, and the inclusion of 2 per cent. chlordane in floor polish resulted in a high mortality of ants crossing linoleum.

The 2 per cent. chlordane spray was used in the attempts at eradication. An infestation over a residential area of 9½ acres and another over an area of three acres in the resting paddocks of the State abattoirs were controlled, except for a few small colonies, in six months, and an isolated infestation at a factory was completely controlled in a year. A residential block in the centre of an infested area that was treated with 2 per cent. chlordane remained free from ants for two months, but had become heavily reinfested after a year; the ants were observed to be affected by contact with a treated surface for at least six months.

Lloyd (N. C.). **The Fruit Tree Bud Weevil, a Pest of young Fruit Trees in the Orange District.**—*Agric. Gaz. N.S.W.* **63** pt. 2 pp. 90–92, 99, 1 fig., 1 ref. Sydney, 1952.

The native weevil, *Perperus vermiculatus* Lea, attacks the buds and young leaves of apple, pear and peach in a belt to the south-west and west of Orange in New South Wales [*cf. R.A.E.*, A **30** 498] and causes serious injury to young apple trees. It has one generation a year, and the larval and pupal stages appear to be passed in the soil. In tests on control in 1950 on young apple and peach trees in an area that had been heavily infested in previous years, the materials investigated were an emulsified solution of 0·1 per cent. DDT, a dust of 2 per cent. DDT and an adhesive banding material impregnated with 10 per cent. DDT. The weevils were first observed on 6th September, were numerous until mid-October, with peak feeding early in that month, and disappeared by mid-November. The dust, which was applied on 13th September, was greatly inferior to the other treatments, and work with it was soon discontinued. Three applications of the spray to the trees and the ground round the trunks, on 13th and 22nd September and 5th October, gave excellent protection, and comparable results were also obtained on apple from a band of the adhesive applied as high as possible on the trunks on 12th September, though it was necessary to renew the surface at frequent intervals until about mid-October and to remove undergrowth from which the weevils might gain access to the trees. Some feeding occurred until the end of September on peach trees with adhesive banding, though no weevils could be observed on them, but after that date there was virtually no feeding on either apple or peach. On the basis of these results, treatment with the adhesive in early September or three applications of the spray at consecutive intervals of seven and ten days, beginning when damage or weevils are first seen, are recommended. The adhesive should be freshened once a week until mid-October, and if the third spray is applied before the end of September, a fourth may be necessary in the first week of October.

Read (F. M.). **The Fruit Fly Campaign.**—*J. Dep. Agric. Vict.* **51** pt. 4 pp. 155–158, 162, 5 figs. Melbourne, 1953.

Dacus ferrugineus tryoni (Frogg.), which has been present in the eastern extremity of Victoria for some years, was observed outside this area for the first time in 1953, when apples, peaches and nectarines at several places near Melbourne were found to be infested. As only single trees were affected, an eradication compaign was initiated, and an account is given of the measures adopted. They comprised the elimination of plants and the

destruction of fruits that could provide alternative breeding sites, the treatment of soil round infested trees with DDT, and the use of tartar-emetic bait-sprays followed by regular sprays of 0·2 per cent. DDT in infested areas.

CARNE (P. B.). **Further Experiments in the Control of *Aphodius howitti* Hope by DDT.**—*Aust. J. agric. Res.* **2** no. 4 pp. 429–434, 4 refs. Melbourne, 1951.

Continued observations during 1948–50 on the numbers of larvae of *Aphodius howitti* Hope in a mixed pasture near Canberra that was treated with DDT in 1946 [*R.A.E.*, A **37** 221; **39** 40] indicated that a single application at the rate of 3·3 lb. p,p′DDT per acre resulted in a significant reduction in the population for at least three seasons. From 1947 onwards, some control of Melolonthid larvae was also obtained as the DDT was washed into the soil; this reached a maximum in 1949. In further tests, a dust of 2 per cent. DDT in loam applied to plots in an infested field of subterranean clover [*Trifolium subterraneum*] in February 1948 at 10–40 oz. p,p′DDT per acre gave complete control of the first-instar larvae by July, even at the lowest rate, and a mixture of 20 lb. 10 per cent. DDT dust and 1 cwt. superphosphate, applied in February 1950 to permanent subterranean-clover pasture at a rate of 1·7 lb. p,p′DDT per acre, gave significant reductions in population by September. In view of its high toxicity to young larvae, stability in the soil and compatibility with superphosphate, DDT is most suitable for use in preventive treatments; it is less toxic to older larvae, and for direct control, applications of lead arsenate or baits of BHC in bran or compost are known to be fairly effective.

BRIMBLECOMBE (A. R.). **The Occurrence of the European House Borer in Queensland.**—*Qd agric. J.* **76** pt. 5 pp. 303–306, 2 figs. Brisbane, 1953.

Hylotrupes bajulus (L.) was found in Queensland in December 1952, when larvae were observed in pine timber from the roof of a prefabricated house in Brisbane that was one of a consignment received from France in 1950. As further samples of damaged timber containing almost mature larvae were subsequently received from the same locality, it appears that this Cerambycid has become established in Australia, and an account is given of its world distribution, bionomics, and control, with brief descriptions of all stages and the damage caused.

TAYLOR (G. G.). **Spray Treatments for Control of Woolly-aphis (*Eriosoma lanigerum* (Haus.)) on Apple Trees.**—*N.Z. J. Sci. Tech.* **34** (A) no. 3 pp. 258–265. Wellington, N.Z., 1952.

Since the introduction of DDT into routine use against pests of apple in New Zealand, there has been a tendency for infestation by *Eriosoma lanigerum* (Hsm.) to increase, but similar increases have also occurred in orchards where DDT has not been used. As no very satisfactory treatment against this Aphid is known, tests were carried out in experimental plots in 1945–50 to ascertain the value of BHC, DDT and some other insecticides for its control. Summer applications of wettable technical BHC at concentrations of 1–4 oz. γ isomer per 100 gals. water and dormant applications at 5–10 oz. per 100 gals. both gave a high degree of control,

but reduced parasitism by *Aphelinus mali* (Hald.). The summer treatments tainted the fruit, but when BHC containing 98–99 per cent. γ isomer was substituted for technical BHC, the flavour of the fruit was unimpaired, even when sprays were applied within three weeks of harvest. The effectiveness of a spray containing 2 oz. γ BHC per 100 gals. was not improved by the addition of 8 oz. p,p′DDT. Neither DDT at concentrations of 4–32 oz. p,p′-isomer nor technical DDD at 8 oz. per 100 gals. applied during the growing season was of value against *E. lanigerum*, and both caused heavy mortality of *A. mali*, so that high populations of *E. lanigerum* subsequently developed; in several commercial orchards in which two or more applications of DDT were made, however, parasitism by *A. mali* reached almost 100 per cent. in the late autumn. Dormant sprays of 1·5 per cent. DNC in oil emulsion failed to control *E. lanigerum*, and although parathion in dormant sprays at 2·4 and 9·6 oz. and in summer sprays at 1·2 and 2·4 oz. per 100 gals. gave partial control, this material was less effective than BHC at comparable concentrations. The addition of winter oil to dormant applications of BHC and parathion only slightly improved control.

Cottier (W.), Harrison (R. A.) & Jacks (H.). **Control of the Grapehouse Mealybug** (*Pseudococcus maritimus* **Ehr.**).—*N.Z. J. Sci. Tech.* **34** (A) no. 3 pp. 266–276, 1 fig. Wellington, N.Z., 1952.

The measure hitherto adopted against *Pseudococcus maritimus* (Ehrh.) on grape vines in glasshouses at Auckland, New Zealand, comprises cleaning the dormant vines and brushing them with a preparation of clay and tar or other materials, but the control obtained was indifferent and further measures, such as spraying with nicotine sulphate or fumigation with hydrogen cyanide, were necessary in summer. As all stages of the mealybug are present during winter, and eggs collected in July were found to hatch within a few weeks and therefore not to be in diapause, the value of winter fumigation with HCN, using a higher concentration than could be applied to the growing vines, was investigated in 1944. Treatment in August with calcium cyanide at about 3 lb. per 1,000 cu. ft. space, with an exposure period of 48 hours, applied to vines rooted outside the glasshouse, gave complete control of *P. maritimus*, but killed all the rods of the vines inside the house.

Tests with insecticidal sprays were begun in 1945, when the vines had grown again, and were continued until 1951. The following is largely the authors' summary of the results, all amounts of DDT referring to the p,p′-isomer. Sprays of 1 or 3 per cent. wettable DDT applied to dormant vines without any subsequent treatment gave low control, but dormant sprays of 0·05, 0·1 or 0·5 per cent. DDT at a rate of ¼ gal. per 12 ft. of vine followed by three applications at intervals of about three weeks in October–November of dusts of 1, 2 or 5 per cent. DDT respectively, at about 1·25 oz. per 12 ft. gave over 90 per cent. uninfested bunches at harvest. Dusts of 1 and 5 per cent. DDT applied four times at intervals of three weeks to vines in foliage at a rate of 1 oz. per 12 ft. for the first two applications and subsequently at 1·5 and 1·75 oz. were fairly effective and did not damage the vines, and residues were well below the tolerance of 7 parts per million. Sprays of 0·1 and 1 per cent. DDT applied during the growing period damaged both foliage and fruit. Crude BHC gave poor control in dusts at 0·5, 1 and 5 per cent. and a wettable-powder spray at 0·1 per cent. in summer, but was effective in an emulsified solution at 0·1 per cent. applied only to one vine; all formulations caused plant injury.

Nicotine sulphate with soft soap gave poor results and damaged the grapes.

The treatment finally recommended comprises a dormant spray of 1 per cent. DDT followed by one or more applications of a dust of 2 per cent. DDT prior to the fruit-thinning period. The number of dust applications should be limited, both to avoid the risk of toxic residues on the grapes and to prevent increased infestation by *Tetranychus* spp. If the vines are rooted outside the house, the external parts should also be treated.

Fry (P. R.). **Occurrence of Lucerne-mosaic Virus in New Zealand.**—*N.Z. J. Sci. Tech.* **34** (A) no. 4 pp. 320–326, 7 figs., 11 refs. Wellington, N.Z., 1952.

The following is based almost entirely on the author's summary. Virus symptoms were found on white and red clover (*Trifolium repens* and *T. pratense*) in trial plots at a place in the North Island of New Zealand and on lucerne in an experimental plot at one in the South Island. A virus recovered from these plants was identified from the symptoms caused, its physical properties and the results of cross-protection tests as lucerne-mosaic virus [*R.A.E.*, A **22** 219, 274]. *Myzus persicae* (Sulz.) transmitted it experimentally from infected clover to tobacco and subterranean clover (*T. subterraneum*). The incidence of infection in pastures is not known.

Lamb (K. P.) & Jacks (H.). **Screening Trials of Acaricides for Control of Tomato Russet Mite** (*Phyllocoptes lycopersici* **Massee**) **in the Glasshouse.**—*N.Z. J. Sci. Tech.* **34** (A) no. 4 pp. 327–334, 1 ref. Wellington, N.Z., 1952.

The results are given of tests in which a dust of micronised sulphur and sprays of nicotine sulphate and various recently developed organic compounds were compared for the control of *Vasates* (*Phyllocoptes*) *lycopersici* (Massee), which has become of increasing importance as a pest of tomatos in New Zealand since its first record there in 1937 [*R.A.E.*, A **26** 45]. The materials were applied to infested tomato plants in pots, and the survival of the mites was estimated after 24 hours. Those that gave significant control in sprays at concentrations of 0·1–1 per cent. were Arathane (a wettable powder containing 25 per cent. dinitrocaprylphenylcrotonate), nicotine sulphate with soft soap, an emulsion concentrate containing 23 per cent. aldrin, Midol 100 + oil and Midol 100 (emulsion concentrates containing 4 per cent. azobenzene, 0·4 per cent. rotenone and 2 per cent. pyrethrins with and without the addition of 5 per cent. mineral oil, respectively), EPN-300 (an emulsion concentrate containing 27 per cent. ethyl p-nitrophenyl thionobenzenephosphonate), Midol T.10 (an emulsion concentrate containing 2·7 per cent. BHC (0·7 per cent. γ BHC), 4 per cent. azobenzene and 0·3 per cent. parathion), Folidol (22·4 per cent. parathion emulsion concentrate), Pestox III (66 per cent. miscible schradan), Aramite (a wettable powder containing 15 per cent. 2-chloroethyl 2-(p-tert.-butylphenoxy)-1-methylethyl sulphite), and summer oil. The first five and the sulphur dust gave complete control in some tests, and Pestox III also gave significant control at 0·05 per cent. Dieldrin, Marlate (a wettable powder containing 44 per cent. p,p′methoxy-DDT) and Higam (a wettable powder containing 25 per cent. γ BHC as lindane) were of doubtful effectiveness, and DDT, chlordane, and di(p-chlorophenoxy)-methane were of no value.

Harrison (R. A.) & Jacks (H.). **Control of Onion Thrips. I. Preliminary Selection of Insecticides.**—*N.Z. J. Sci. Tech.* **34** (A) no. 4 pp. 335–338, 1 ref. Wellington, N.Z., 1952.

Onions in New Zealand are severely damaged by thrips, of which the chief species is *Thrips tabaci* Lind. In a brief general account of its bionomics and the damage caused, it is stated that the minimum duration of successive generations of *T. tabaci* reared under glasshouse conditions during the summer of 1951–52 was 23 days, and that if a similar period is sufficient in the field, as many as six generations could develop in a year. In the same season, several insecticides were compared for the control of *T. tabaci* in sprays applied at a rate of 1 gal. per 240 ft. of row. The materials tested, with the amounts used per 100 gals., were 1·3 pint nicotine sulphate with 5 lb. soft soap or 1·2 gals. summer oil, the summer oil alone, 1·5 lb. Nexol (an emulsion concentrate containing 16 per cent. γ BHC as lindane), 2·5 lb. Trimol-DDT (an emulsion concentrate containing 25 per cent. p,p′DDT), 1 gal. Midol T.10 (an emulsion concentrate containing 2·7 per cent. BHC (0·7 per cent. γ BHC) with 4 per cent. azobenzene and 0·3 per cent. parathion), 1 lb. Folidol (25 per cent. parathion emulsion concentrate), Pestox III (66 per cent. miscible schradan) or Isopestox (90 per cent. miscible bis(monoisopropylamino)fluorophosphine oxide), and 1 pint Hexone (15–20 per cent. tetraethyl pyrophosphate) alone or included in the sprays of Nexol, Trimol-DDT, Pestox III or Isopestox. Applications were made at intervals of 7 and 14 days, except in the case of Pestox III used alone or in combination with Hexone, for which the intervals were 14 and 28 days. With the exception of the sprays containing summer oil, all were more effective at the shorter intervals, and the differences were significant for Folidol, Isopestox, Trimol-DDT, and Hexone alone and in combination with Nexol and Isopestox. From a statistical analysis of the results, it is shown that the best materials, in order of decreasing effectiveness, were Folidol, Hexone with Nexol, Hexone with Trimol-DDT, Isopestox and Trimol-DDT.

Leston (D.). **Notes on the Ethiopian Pentatomidae (Hem.). I. The Genotype of *Antestia* Stål.**—*Rev. Zool. Bot. afr.* **45** fasc. 3–4 pp. 268–270, 2 figs., 6 refs. Tervuren, 1952.

The author finds that the characters of *Antestia lymphata* Kirk., which is the type of its genus, differ markedly from those of the species hitherto included in *Antestia* that are pests of coffee in Africa and the Oriental region, and erects the new genus *Antestiopsis* for the coffee bugs, including *A. faceta* (Germ.), the group of *A. lineaticollis* (Stål), and *A. anchora* (Thnb.), which is the genotype. Characters differentiating the two genera are given.

Belyea (R. M.). **Death and Deterioration of Balsam Fir weakened by Spruce Budworm Defoliation in Ontario.**—*Canad. Ent.* **84** no. 11 pp. 325–335, 7 figs., 10 refs. Ottawa, 1952.

The factors contributing to the deterioration of balsam fir (*Abies balsamea*) following infestation by *Choristoneura fumiferana* (Clem.) were investigated during 1946–51 in an area south-west of Lake Nipigon, in north-western Ontario, where a severe outbreak of that Tortricid was in progress. In this paper, which is the first of a proposed series, notes are given on the habits and seasonal history of the insects found breeding in dying and recently killed trees. They comprised seven species of Coleoptera and three

Siricids, of which much the most abundant were the Scolytid, *Ips* (*Pityokteines*) *sparsus* (Lec.), and the Lamiid, *Monochamus scutellatus* (Say).

I. sparsus, which heavily infested most of the severely defoliated trees, produced two broods during the year, of which the first overwintered in the adult stage and the second, which was considerably smaller, in the larval stage; the emergence periods of the adults overlapped, however, and all appeared during June and early July. Eggs were laid in brood chambers 1–2 inches in length that radiated from a nuptial chamber, entered both the outer sapwood and the inner bark, and tended to encircle the tree. They hatched in 12–14 days, and the larvae mined at right angles to the brood galleries, mostly in the inner bark, for distances of 2–3 inches. First-brood larvae pupated after about two months, and overwintering larvae after about ten. Pupation occurred in cells at the wood surface, within the sapwood or in the bark, and the pupal stage lasted about 12 days. The number of attacks per sq. ft. of wood surface ranged from 2·6 to 83·8, and no particular part of the tree was preferred.

M. scutellatus was less abundant than *I. sparsus*. Adults emerged between the second or third week of June and mid-August, and oviposition began about 1st July. During July and early August, eggs were laid in recently killed trees, most of which were already infested by *I. sparsus*, and in uninfested, dying trees. The resulting larvae mined between the bark and wood until late September, when they entered the wood and overwintered, mining further during the following year. A second winter was passed in pupal cells formed just below the surface of the wood, and pupation occurred in the spring. Eggs were sometimes laid round branch scars and wounds in weakened living trees between late July and early September, and most of the resulting larvae overwintered between the bark and the wood and did not enter the wood until June. Trees were often attacked again during the summer following death if they were sufficiently moist. Evidence was obtained that populations of *M. scutellatus* are distributed at random round the tree and in general increase with increasing height.

McLeod (J. H.) & Chant (D. A.). **Notes on the Parasitism and Food Habits of the European Earwig, *Forficula auricularia* L. (Dermaptera: Forficulidae).**—*Canad. Ent.* **84** no. 11 pp. 343–345, 3 refs. Ottawa, 1952.

During 1936–38, several colonies of the introduced Tachinid, *Bigonicheta setipennis* (Fall.), were liberated in Vancouver, British Columbia, against *Forficula auricularia* L., and a survey was made in 1950 to determine the abundance and distribution of this parasite and, if possible, obtain colonies for introduction into Newfoundland. It was found that there was a significant fluctuation in daily catch of earwigs [*cf. R.A.E.*, A **41** 226] and that more were taken in traps on trees than on the ground. Their relative abundance in these two situations was further investigated in September 1951, when observations were also made on the relative degrees of parasitism and on the food of *F. auricularia*. The methods adopted are described. Traps were operated for a period of 12 days, beginning on 27th September, during which three times as many earwigs were taken per trap per day on trees as on the ground. In feeding tests, earwigs offered lettuce leaves, carrot, meat meal, *Dahlia* flowers and colonies of *Brevicoryne brassicae* (L.) fed only on the last two, of which they consumed approximately equal weights. Other insects of which large quantities were eaten in the laboratory included *Eriosoma lanigerum* (Hsm.), *Eulecanium* (*Lecanium*) *corni* (Bch.), *Lepidosaphes ulmi* (L.) (including overwintering eggs), and *Aspidiotus* sp. Aphids or Coccids were preferred to meat meal,

and Syrphid larvae were not attacked. As the foliage of the trees bearing the traps was undamaged, it is concluded that the earwigs were attracted by the presence of animal food in the form of small insects.

B. setipennis was more than twice as numerous in earwigs from trees as from the ground, probably because refuges in which the earwigs can shelter during the day are fewer and therefore more populous on the trees. Since *B. setipennis* was observed to be attracted to its host by odour, it is probably attracted more to these aggregations than to earwigs scattered on the ground.

Matthewman (W. G.), Harcourt (D. G.) & Perron (J. P.). **Timing of DDT Applications for Control of Caterpillars on Cabbage.**—*Canad. Ent.* **84** no. 11 pp. 346–352, 5 refs. Ottawa, 1952.

Cabbages in the Ottawa district are commonly damaged by larvae of *Pieris rapae* (L.), *Plutella maculipennis* (Curt.) and *Trichoplusia ni* (Hb.). Early varieties, which sometimes escape infestation, are planted out in late May and are attacked chiefly by *Pieris* and, to a less extent, *Plutella*. Since the heads have usually formed by the time the attack becomes severe, rotenone dusts or sprays are recommended for control, and 1–2 applications in late June or early July are effective against all three species. Late varieties are planted out at the end of June and are subject to attack from July to October, with a peak in August. *Pieris*, which is responsible for most of the damage, predominates during July and the first part of August, *Plutella* in September and October and sometimes even in August, and *T. ni*, which rarely accounts for more than 5 per cent. of the total infestation, in late August and early September. All three species are readily controlled by properly timed sprays or dusts of DDT, but since the intensity and date of infestation vary considerably from year to year, the number and timing of the applications were investigated in Ontario in 1947, 1948 and 1950 and in Quebec in 1949, when schedules comprising 1–4 applications of a 3 per cent. DDT dust at 35–40 lb. per acre were tested in experimental plots. Applications were made on or about 20th July and 2nd, 15th and 30th August; the general level of infestation was high in 1947 and 1948, moderate in 1949 and low in 1950. The effectiveness of the treatments was assessed on the basis of foliage injury 2–5 weeks before harvest. It was found that all three species were controlled by applications directed primarily against *Pieris* and that the best results were obtained when the first application was made before peak populations of this species were reached. A schedule of four applications gave almost complete control, and is regarded as the best for years of average infestation, though three applications, beginning on 20th July, may suffice in years when populations of *P. rapae* decrease rapidly in late August and the other two species are not numerous.

Capps (H. W.). **A Correction in the Synonymy of the Cabbage Webworm (*Hellula undalis* (F.)) (Lepidoptera: Pyraustidae).**—*Bull. S. Calif. Acad. Sci.* **52** pt. 2 pp. 46–47, 6 figs. Los Angeles, Cal., 1953.

Recent investigations have shown that the Pyralid known in the United States as the cabbage webworm is *Hellula rogatalis* (Hulst), which was described from Texas and has long been considered to be identical with *H. undalis* (F.). Characters differentiating the two species are given. *H.*

undalis occurs in the Mediterranean subregion and in the Ethiopian and Oriental regions, and it is doubtful whether it is present in the western hemisphere.

HORNSTEIN (I.) & SULLIVAN (W. N.). **Determination of Lindane in Air.**—*Analyt. Chem.* **25** no. 3 pp. 496–498, 6 refs. Easton, Pa., 1953.

The authors describe a method of determining small amounts of lindane [virtually pure γ BHC] in air, by which concentrations as low as 0·1 mmg. per litre can be measured. It is of practical importance because of the extensive use of lindane vapour for insect control, and the fact that it measures all isomers of BHC does not introduce an error, because the lindane is always vaporised alone.

An air sample is drawn through gas-washing bottles containing acetic acid or through an alumina adsorption column, from which the adsorbed lindane is washed with acetic acid. The second process is the more practical, requiring a minimum of equipment and time, and gives results that are precise and in agreement with those obtained by the first. The quantity of lindane is determined by an adaptation of a colorimetric method, in which the compound is dechlorinated to benzene and this nitrated to m-dinitrobenzene, which, after extraction, is allowed to react with methyl ethyl ketone in the presence of strong alkali; the violet-red colour that develops is measured photometrically, and the BHC determined from a calibration curve prepared from a standard solution of lindane in glacial acetic acid.

It is concluded that under optimum conditions, the concentration of lindane in air can be determined with a precision of about ±2 per cent. Air can be sampled at the rate of 0·2 cu. ft. per minute. In an enclosed space, with very little air interchange, lindane concentrations of about 90 per cent. saturation, as calculated from known vapour-pressure measurements, were found.

MARICONI (F. A. M.). **As lagartas das palmeiras.** [The Caterpillars of Palm Trees.]—*Biológico* **18** no. 6 pp. 103–107, 5 figs., 1 ref. São Paulo, 1952.

Brassolis sophorae (L.) and *B. astyra* Godt., the distribution of which is summarised, are injurious in Brazil to various palms, notably *Copernicia cerifera*, coconut and date. *B. sophorae* is less widespread than *B. astyra* but is of greater economic importance as it is the main species on *C. cerifera* and coconut in the north-east, where these palms are largely grown. In Pernambuco, they also attack banana and very occasionally sugar-cane. The two species, all stages of which are briefly described, have similar habits, the larvae feeding on the leaves, and notes on their bionomics are included [*cf. R.A.E.*, A **23** 60; **31** 515].

In São Paulo, where both occur, the eggs are parasitised by *Telenomus* sp. (possibly *T. nigrocoxalis* Ashm. [cf. **23** 61]) and the larvae by *Xanthozona melanopyga* (Weid.) [**31** 515], which afford considerable control. *Spilochalcis* sp., *S. morleyi* Ashm. and *S. nigrifrons* Cam. [**41** 420] have been reared from the cocoons in various parts of Brazil but are of little importance. Methods of control include the destruction of débris in the plantations and of neighbouring food-plants and collection of the shelters in which the larvae pass the day. In the north, *B. sophorae* is controlled by dusting with 2 per cent. BHC at intervals of 20–25 days, but powerful machines are usually necessary in view of the height of the palms.

Mariconi (F. A. M.). **O percevejo do maracujá** *Diactor bilineatus* **(Fabr., 1803).** [The Maracujá Bug, *D. bilineatus.*]—*Biológico* **18** no. 7 pp. 116–120, 3 figs., 1 ref. São Paulo, 1952.

Passiflora quadrangularis occurs throughout Brazil and is much cultivated in the north-east, where the fruits are used in the preparation of confectionery and drinks. In São Paulo, the plant is severely attacked by *Diactor bilineatus* (F.), a Coreid that is also found in many other parts of the country. The nymphs infest the flower buds, newly formed fruits and leaves and the adults feed on the stem, flower buds and fruits, which last dry up or become covered with small protuberances if they were already well developed at the time of attack. All stages of the bug are described. The eggs are laid in groups of 6–9 on the lower surfaces of the leaves. In the laboratory, the eggs and nymphal stages lasted 13–16 and 44–49 days, respectively. Development is continuous throughout the year in São Paulo, but is protracted during winter. The bug can be controlled by hand collection and by spraying with parathion every 15–20 days from the time when the flower buds appear, which gave good results in tests.

de Figueiredo jr. (E. R.). **O percevejo-saltador das hortaliças** *Halticus bracteatus* **(Say, 1832).** [The Garden Fleahopper, *H. bracteatus.*]—*Biológico* **18** no. 7 pp. 121–122, 1 fig. São Paulo, 1952.

The Mirid, *Halticus bracteatus* (Say), the adults of both sexes of which are briefly described, was observed causing serious injury to vegetables in nursery plots near Santos, Brazil. The plants mainly attacked were parsley and various crucifers. Dusts of 0·02 per cent. parathion gave effective control.

de Toledo (A. A.). **Notas preliminares sôbre o contrôle da broca do rizoma da bananeira** (*Cosmopolites sordidus* **Germ.).** [Preliminary Notes on the Control of the Banana Borer, *C. sordidus.*]—*Biológico* **18** no. 9 pp. 145–152, 1 fig., 3 refs. São Paulo, 1952.

Cosmopolites sordidus (Germ.) is injurious to banana in Brazil and is difficult to control as the larvae are inaccessible and the plants are very susceptible to injury by persistent insecticides. Since the planting of uninfested material is a first necessity, various methods of disinfestation were tested. Fumigation with methyl bromide was injurious to the rhizomes and immersion in water for 20 days led to rotting, so that the only method suitable for general use is stripping off the two outer layers and removing any infested parts.

In a test of the protective value of insecticides, dusts of 3 per cent. BHC, 5 per cent. chlordane or 20 per cent. toxaphene were applied to the soil round each plant in a new plantation in which the rhizomes had been freed from infestation by stripping. Half of the experimental plants were treated once a month and the other half every two months, beginning when they were four months old, and the amount of dust applied was 6–8 gm. per plant. The plants grew well during the first year, but were subsequently attacked by the fungus causing Panama disease, those treated with BHC being the first attacked, and the experiment was terminated. Examination of the rhizomes showed that the percentages of plants attacked by *C. sordidus* in the groups treated monthly and (in brackets) every two months were 0 (0) for BHC, 20 (40) for chlordane and 20 (60) for toxaphene, as compared with 80 in the controls. Fruit production was affected by the

disease, but there was some evidence that it was reduced by BHC and increased by chlordane and toxaphene. None of the materials affected fruit flavour.

In tests with baits, six pieces of thick rhizome cut downwards or across, which proved to be the most attractive, were inserted into the ground, and two were then dusted with 10 per cent. BHC and two with 50 per cent. chlordane. They remained attractive for 50 days, and collections of weevils made from them every three days during this period yielded 313 and 207 from the dusted baits, respectively, as compared with 222 from the controls. Of these last, 93 showed signs of poisoning and had evidently visited the treated baits, so that the effectiveness of the latter may have been greater than was apparent. BHC appeared to have attracted the weevils, and chlordane to have been slightly repellent. Good results were also obtained by splitting dead rhizomes remaining in the soil after the removal of banana plants, in which the weevils shelter, and dusting their internal surfaces with BHC or chlordane. This treatment should be repeated at intervals of 3–4 months.

DE TOLEDO (A. A.). **Notas sôbre o contrôle da broca da figueira,** *Azochis gripusalis.* [Notes on the Control of the Fig Borer, *A. gripusalis.*]—*Biológico* **18** no. 10 pp. 167–169, 1 fig., 1 ref. São Paulo, 1952.

The damage caused to fig in São Paulo by *Azochis gripusalis* Wlk. is briefly described [*cf. R.A.E.*, A **8** 211; **29** 392], and an account is given of experiments in 1951–52 in which insecticides for the control of this Pyralid were added, between 12th October and 27th April, to the fungicidal sprays of bordeaux mixture applied fortnightly. Two weeks after the last application, the percentages of branches infested were 0 for 0·25 and 0·125 per cent. DDT and 0·5 and 11·4 for 0·2 and 0·1 per cent. toxaphene in wettable powders and 17 and 24 for 0·15 and 0·1 per cent. of an emulsion concentrate containing 14 per cent. γ BHC as lindane, as compared with 66 for bordeaux mixture alone or no treatment.

JACOBY (M.). **Die Erforschung des Nestes der Blattschneider-Ameise** *Atta sexdens rubropilosa* **Forel (mittels des Ausgussverfahrens in Zement). Teil I.** [Investigations of the Nest of the Leaf-cutting Ant, *A. sexdens rubropilosa* (by Means of Cement Casts). Part I.]—*Z. angew. Ent.* **34** pt. 2 pp. 145–169, 25 figs., 3 refs. Berlin, 1952.

The author has investigated many nests of *Atta sexdens rubropilosa* Forel in Brazil by the process of pouring in liquid cement and freeing the resulting casts from soil [*R.A.E.*, A **27** 271]. The method and the structure of the nests are described in detail with reference to work on fumigation as a means of control [*cf.* **23** 756, etc.]. It is concluded that, contrary to popular belief, there is no main passage leading directly to the nest chambers and that poisonous gases should be introduced into the peripheral passages through which fresh air enters [**28** 280].

BECKER (G.). **Frass von Lepidopteren im Kambium gesunder Kiefern in Mittel- und Nordamerika.** [Feeding by Lepidoptera in the Cambium of healthy Pines in Central and North America.]—*Z. angew. Ent.* **34** pt. 2 pp. 170–177, 3 figs., 10 refs. Berlin, 1952.

During investigations in 1951 on an outbreak of *Dendroctonus* spp. on pines in Guatemala [*R.A.E.*, A **41** 132], larvae of an unidentified Aegeriid were found mining in the cambium near the base of healthy examples of

Pinus rudis and to a less extent of *P. pseudostrobus* and *P. oocarpa*, causing considerable flow of resin. They pupated in resin masses on the surface of the tree. The larvae, pupal cases and damage caused are described. The larvae were widely distributed, but few occurred per tree, so that injury was usually not severe. Attack appeared to originate at the sites of small injuries, and infested trees were attractive to *Dendroctonus*. Parasitism of the larvae by Tachinids exceeded 30 per cent. in some places. Control is unnecessary, though individual heavily infested trees should be removed. Notes are given on larvae of two other species of Lepidoptera found in the cambium, and the Lepidoptera that are primary pests of conifers in North America are briefly reviewed from the literature.

Schwerdtfeger (F.). **Studien über den Massenwechsel einiger Forstschädlinge. IV. Untersuchungen über den " Eisernen Bestand " von Kiefernspanner** (*Bupalus piniarius* **L.), Forleule** (*Panolis flammea* **Schiff.) und Kiefernschwärmer** (*Hyloicus pinastri* **L.).** [Studies on the Variation in Abundance of some Forest Pests. IV. Investigations on the natural Density of *B. piniarius*, *P. flammea* and *Sphinx pinastri*.] —*Z. angew. Ent.* **34** pt. 2 pp. 216–283, 23 graphs, 41 refs. Berlin, 1952.

In this further paper of a series [*cf. R.A.E.*, A **23** 349, 661; **25** 126], a detailed account is given of investigations in 1934–45 on the pupae of *Bupalus piniarius* (L.), *Panolis flammea* (Schiff.) and *Sphinx* (*Hyloicus*) *pinastri* L. found overwintering in pine forests to the north of Berlin and on the adults that emerged from them in an unheated insectary. The populations fluctuated considerably in numbers but are considered not to have exceeded the limits of natural density [*cf.* **36** 352].

The following is based largely on the author's summary. Averages of about 54 per cent. of the pupae of *Bupalus*, 51 per cent. of those of *Panolis* and 47 per cent. of *Sphinx* were females. The proportion of females was lower on two occasions in decreasing populations of *Bupalus* and higher once during an increase in numbers of *Panolis*. Parasitism was apparently heavier among the male pupae in these two species and among female pupae in *Sphinx*. The weights of the pupae of *Bupalus* and *Panolis* were above the average in increasing and below it in decreasing populations, but varied very little in *Sphinx*. The egg-production of *Bupalus* was fairly constant, with an average of 140 per female but that of *Panolis* varied from 109 to 197 according to pupal weights. The percentages of pupae from which adults emerged ranged from 3 to 66 in *Bupalus*, 31 to 80 in *Panolis* and 21 to 55 in *Sphinx*. The principal causes of mortality were fungi for *Bupalus*, fungi, diseases, insect parasites and desiccation for *Panolis*, and all these factors except insect parasites for *Sphinx*. Pupae of the last entered prolonged diapause in three years (1936–38). The causes were unknown, but the phenomenon has also been observed in Poland [**27** 676].

Lists are given of the parasites reared, showing their frequency. *Ichneumon nigritarius* Grav. was much the most numerous of the six from *Bupalus*, and *Zenillia* (*Phyrxe*) *erythrostoma* (Htg.), *Z.* (*Exorista*) *cincinna* (Rond.) and *Z.* (*P.*) *vulgaris* (Fall.) of the seven from *Sphinx*. *Panolis* was parasitised by eight Ichneumonids, none of which was common, and two more were also received. Notes on a few of the parasites are included, and attention is drawn to the absence of some well-known species.

The fluctuations in population density and sex ratio could not be correlated with weather, although warm damp conditions favoured feeding by larvae of *Bupalus* and *Panolis* and hot dry conditions restricted it, thus affecting the weight of the pupae. Warm dry weather in 1937 is held

responsible for a decline in the numbers of both these species in 1937–39. The rigorous winter of 1939–40 caused no increase in pupal mortality. There was a direct relation between the abundance of *Panolis* and that of its parasites, which mostly have one generation a year, but the parasites of the other two species mostly have more than one, and their frequency partly reflected that of their alternative hosts. The investigations indicated that the population of these pests is influenced by the same factors in a state of natural density as during outbreaks but that their maximum effects are not revealed by studies of the pupae alone. Observations covering all stages are desirable.

Gäbler (H.). **Die Tachine** *Carcelia processioneae* **Rtzbg. als Parasit des Kiefernprozessionsspinners** *Cnethocampa pinivora* **Tr.** [The Tachinid, *C. processioneae* as a Parasite of *Thaumetopoea pinivora*.]—*Z. angew. Ent.* **34** pt. 2 pp. 294–296, 3 figs. Berlin, 1952.

Thaumetopoea (*Cnethocampa*) *pinivora* (Treit.) has been numerous on pine near Hoyerswerda, east-central Germany, since 1947. It has few parasites, and the only one reared from the pupae in 1948–50 was the Tachinid, *Carcelia processioneae* (Ratz.). Although rare in 1948–49, it gave almost 10 per cent. parasitism in 1949–50 [*cf. R.A.E.*, A **41** 434]. Only one larva was found in each host. The larvae pupated mainly in December–January in an unheated, frost-free room, though some had not done so by the end of May, and the adults emerged in March–June. The larva and puparium are described. The Tachinid is believed to have one generation a year, whereas development of the host lasts two years [*cf.* **25** 308]. Possible effects of this on the numbers of the parasite are discussed.

Groschke (F.). **Der "schwarze Nutzholzborkenkäfer",** *Xylosandrus germanus* **Blandf., ein neuer Schädling in Deutschland.** [*Xyleborus germanus*, a new Timber Pest in Germany.]—*Z. angew. Ent.* **34** pt. 2 pp. 297–302, 10 figs., 2 refs. Berlin, 1952.

During investigations in a forest near Darmstadt in the late summer of 1952, adults of *Xyleborus* (*Xylosandrus*) *germanus* Bldf., a bark-beetle that was described from Japan and has not previously been recorded from Germany, were observed in the stumps of beech and oak felled during the preceding winter. Its distribution and bionomics in the United States are reviewed from the literature [*R.A.E.*, A **29** 550, etc.]. Breeding apparently began in late March or early April. Very humid wood was preferred [*cf.* **29** 551], damp stumps in shady positions being heavily infested and dry ones on sunny sites avoided. The beetles frequently entered beech from the cut surface but always bored through the bark into oak, exposed surfaces of which dry out quickly. The significance of *X. germanus* as a potential primary pest in Germany is discussed; its eradication is desirable.

Dosse (G.). **Zur Biologie und Morphologie des Schwarzen Triebrüsslers** *Ceuthorrhynchus picitarsis* **Gyll., mit differentialdiagnostischen Angaben zur Unterscheidung der Larven von** *Ceuthorrhynchus napi* **Gyll.,** *C. quadridens* **Panz. und** *C. picitarsis* **Gyll.** [Contribution to the Biology and Morphology of *C. picitarsis* with comparative diagnostic Data for differentiating Larvae of *C. napi*, *C. quadridens* and *C. picitarsis*.]—*Z. angew. Ent.* **34** pt. 2 pp. 303–312, 7 figs., 12 refs. Berlin, 1952.

Observations on the morphology and habits of the larvae and adults of *Ceuthorrhynchus picitarsis* Gylh. are recorded, based on examples reared

on turnip rape in the laboratory in Germany, and characters are given differentiating the larvae of *C. picitarsis*, *C. quadridens* (Panz.) and *C. napi* Gylh.

WEBER (G.). **Grosseinsatz von Nebel- und Sprühgeräten zur Bekämpfung der Kirschfruchtfliege in Hessen.** [Large-scale Use of Fog and Spray Appliances for the Control of the Cherry Fruit-fly in Hessen.]—*Anz. Schädlingsk.* **25** pt. 4 pp. 53–56, 2 figs., 4 refs. Berlin, 1952.

A large-scale operation for the control of the cherry fruit-fly [*Rhagoletis cerasi* (L.)] by means of a DDT fog was undertaken in 1951 in a cherry-growing area in south-western Germany containing about 9,000 trees, where infestation of late-ripening varieties had generally been heavy and where a smaller control experiment had given good results in the previous year [*R.A.E.*, A **41** 330]. Treatment was applied in the morning or evening on 7th–13th June, a few days after the beginning of adult emergence, as observed by exposing overwintered puparia in the open and hanging glass bait-traps containing 2 per cent. ammonium stearate in the trees, and before it reached its peak. The deposits obtained are not specified, but they were such as to give 50 per cent. knockdown in 24 hours of adults of *Drosophila* confined with leaves from treated trees. There was no injury to honey bees. The percentages of infested fruits, estimated on trees situated at least 100 yards from the path of the machines on 3rd July, during the picking of medium-early cherries, and on 12th and 20th July, during that of the late varieties, were 0·7, 1·1 and 3·4, respectively, as compared with 55 on a few untreated trees in the locality. Although larvae in all instars were present on 20th July and young ones were as numerous as old ones, all had left wild cherries examined on 4th August, from which it is concluded that oviposition must have ceased about mid-July and that the insecticidal deposit had therefore remained effective for about six weeks.

Since there were numerous apple trees in the treated area, the effect of the treatment on infestation by the codling moth [*Cydia pomonella* (L.)] was investigated. About 10 per cent. of the total crop, including fallen apples, was infested, as compared with about 25 per cent. in an untreated orchard just over a mile away, and in addition, infestation by the fungus, *Sclerotinia* (*Monilia*) *fructigena*, which attacks the fruits through punctures made by insects, was reduced from 10·8 to about 1 per cent.

Cherry trees in another locality in which similar conditions obtained but which was not suitable for fog treatment were sprayed twice with DDT against *R. cerasi* with excellent results, and the reliability of emergence data gained by exposing puparia was confirmed.

BODENSTEIN (G.). **Ein Freiland-Massenvorkommen von *Trialeurodes vaporariorum* Westw.** [A Mass Occurrence of *T. vaporariorum* in the Field.]—*Anz. Schädlingsk.* **25** pt. 4 pp. 57–59. Berlin, 1952.

A considerable outbreak of *Trialeurodes vaporariorum* (Westw.) originating from an experimental glasshouse at Ingelheim, on the Rhine, occurred in 1951. The Aleurodid multiplied rapidly in the field, despite cold damp weather, and a list is given of wild and cultivated plants of 29 families that were infested. Those most heavily attacked included beans and mulberry. Plants in exposed situations were generally less infested than those sheltered by walls or hedges. October frosts killed large numbers of

adults, but considerable colonies of adults and larvae survived into January, and a few adults protected by snow withstood very cold weather in February, when air temperatures fell to −10°C. [14°F.].

Schaerffenberg (B.). **Ursachen der Atemgift- und CO_2-Resistenz von Drahtwürmern und Maikäferengerlingen.** [Causes of the Resistance of Wireworms and Cockchafer Larvae to Fumigants and Carbon Dioxide.]—*Anz. Schädlingsk.* **25** pt. 4 pp. 59–60, 4 graphs, 7 refs. Berlin, 1952.

The ability of Elaterid and Melolonthid larvae to survive exposure to carbon dioxide for considerable periods was demonstrated in tests in which larvae of *Ctenicera* (*Selatosomus*) *aenea* (L.), *Agriotes obscurus* (L.) and *Melolontha melolontha* (L.) suffered less than 50 per cent. mortality after 14 days' exposure and none after eight. It is considered that they supplement and if necessary replace normal respiration by intramolecular respiration, in which substances rich in oxygen, such as glycogen, are transformed into others deficient in it, such as fat, and the oxygen is made available as a source of energy. Respiration can thus be reduced to a minimum, which explains the resistance of the larvae to flooding and the poor effectiveness of fumigants against them.

Bender (E.). **Kann die Überwachung der Eiablage des Apfelwicklers *Carpocapsa* (*Cydia*) *pomonella* L. die Flugkontrolle ersetzen?** [Can Observations on Oviposition by *Cydia pomonella* replace Flight Records?]—*Anz. Schädlingsk.* **25** pt. 5 pp. 68–72, 4 figs., 12 refs. Berlin, 1952.

The effectiveness of sprays against *Cydia* (*Carpocapsa*) *pomonella* (L.) on apple and pear depends considerably upon correct timing, but data on moth activity in the region of Germany bordering on Lake Constance, where infestation varies from year to year, are lacking. Bait-traps do not give reliable emergence data in years in which few adults are on the wing, and the possibility of replacing them by observations on the development of larvae and pupae in trap bands left on the trees over winter and examination of the trees for eggs, the presence of which is more important for the spray programme than adult flight, was investigated, mainly in 1949–51. Eggs were found to be more numerous on the apple and pear fruits than on the leaves, and the first were observed about 24–39 days after the trees had finished flowering. They hatched in 7–16 days, and about 80 per cent. of the larvae entered the fruits at the side and the rest at the calyx end [*cf. R.A.E.*, A **27** 163]. The dates of appearance of the first and last pupae and adults for the three years were obtained from the trap bands, but although some adults emerged in May, oviposition did not begin until June, on evenings when the temperature reached at least 16°C. [60·8°F.]. Eggs of a second generation were numerous in August 1950, but not in the other two years.

The dates for the first spray were determined from observations on the numbers of eggs found on the fruits and the rate of embryonic development, and two applications were made, one in the second or third week in June and the other early in July. Both DDT and parathion were superior to lead arsenate until mid-July, but lead arsenate gave the best results at the end of the month. The value of a third application and of measures against the second generation when it is numerous [*cf.* **41** 289, etc.] is to be investigated.

Wolfram (R.). **Zur Einstäubung von Getreide mit Kontaktinsektiziden.** [Dusting Stored Grain with Contact Insecticides.]—*Anz. Schädlingsk.* **25** pt. 5 pp. 73–75, 11 refs. Berlin, 1952.

Fumigation gives good control of pests of stored grain but is not suitable for use in small granaries on private farms, and the likelihood of early reinfestation there is so great that other methods giving more durable protection are preferable. In tests of their persistence, commercial dusts containing 10 per cent. DDT or 0·65 per cent. γ BHC were mixed at the rate of 0·1 per cent. with rye infested by *Calandra granaria* (L.) and *C. oryzae* (L.) or with uninfested wheat into which adults of both weevils had been introduced eight days previously. The rye had heated and was cooled to 80°C. [46·4°F.] before treatment. Both it and the wheat were cleaned after 7–10 days, and all the adults then found were dead. The grain was then stored at a temperature that rarely exceeded 15°C. [59°F.] and again cleaned and washed after a further 14 weeks. No living adults were found in the wheat, and extremely few (all affected by the dusts) in the rye, but larvae and adults of *Tinea granella* (L.) were present in considerable numbers in the latter. Adults of *C. granaria* 14–28 days old were subsequently enclosed with samples of each grain, and after 19 days at 20°C. [68°F.], the mortality percentages were 89·7–100, as compared with 18·6 in untreated controls. Grain that had not undergone the washing process killed 99·8–100 per cent. of the weevils placed in it. Both materials thus gave excellent protection for a considerable period, in spite of cleaning and washing, but as this indicates the presence of considerable residues on the cleaned grain, there may be some risk to consumers.

Gösswald (K.). **Die Rote Waldameise im Dienste der Waldhygiene. Forstwirtschaftliche Bedeutung, Nutzung, Lebensweise, Zucht, Vermehrung und Schutz.** [The Red Forest Ant in the Service of Forest Hygiene. Its Significance in Forest Economy, Exploitation, Bionomics, Rearing, Propagation and Protection.]—160 pp., 6 col. pls., 52 figs., 70 refs. Lüneburg, M. Kinau Verlag [1951].

In this booklet, the author explains the advantages to be gained in unmixed forests of pine or spruce in Germany by encouraging and artificially colonising suitable forms of *Formica rufa* L., which destroy numerous insect pests of forests. The most useful is the small form (*minor*) of the subspecies *rufopratensis* Forel, some of the information on which has been noticed [*R.A.E.*, A **41** 250, etc.]. The habits of these ants and the methods to be adopted are described in detail, and keys are appended to all the ants that occur in forests in Germany, including one to the group of *F. rufa*, with notes on their ecology and habits.

Vité (J. P.). **Die holzzerstörenden Insekten Mitteleuropas.** [The Wood-destroying Insects of Central Europe.]—[Vol. 1] Text, $8\frac{1}{4} \times 5\frac{3}{4}$ ins., [6+] 155 [+1] pp., 10 pls., 8 figs., $18\frac{1}{2}$ pp. refs. Göttingen, "Musterschmidt" wiss. Verlag, 1952. [Vol. 2] Plates, $8\frac{1}{4} \times 5\frac{3}{4}$ ins., 78 pp., 228 figs. (113 col.). 1953. Price *DM*.28.

This handbook on insects that damage forest trees and timber in Germany and other parts of Central Europe is divided into two parts. In the first, general accounts of insect morphology and biology and the ecology and economic importance of wood-destroying insects are followed by more detailed sections on the bionomics, distribution and sometimes control of

individual species, of which the majority are Coleoptera. In the second, these insects and the damage they cause are illustrated in numerous figures, and a preliminary list shows the species that attack timber and trees of different sorts, with the type of injury caused and cross-references to the figures. Both parts are provided with indexes.

KANGAS (E.). **Über die Brutstättenwahl von** *Dendroctonus micans* **Kug. (Col., Scolytidae) auf Fichten.** [On the Selection of Breeding-places by *D. micans* on Spruce.]—*Ann. ent. fenn.* **18** no. 4 pp. 154–170, 9 figs., refs. Helsinki, 1952.

Dendroctonus micans (Kug.) is a well-known pest of spruce in Finland, and in view of divergent opinions as to the extent to which it is a primary pest, the author analyses and discusses the results of examinations of infested trees in various parts of the country in 1934–52. It was found that the Scolytid preferred apparently healthy trees [*cf. R.A.E.*, A **33** 7], usually those of considerable girth, or trees that were only slightly weakened, and left them as soon as their condition deteriorated, as occurred after infestation for 2–3 years. Infestation was favoured in several cases by exudation of resin caused by mechanical injury or attack by fungi, but such relations were not always established, and it is considered that the factors observed formed only part of a larger complex conditioning the trees for infestation.

RUMMUKAINEN (U.). **Über Triebschäden an jungen Fichten, verursacht durch die Gelbe Fichten-Grossgallenlaus,** *Sacchiphantes* (*Chermes*) *abietis* **L., Cholodk. (Aphid., Chermesinae).** [On Injury to young Spruce Shoots caused by *Chermes abietis.*]—*Ann. ent. fenn.* **18** no. 4 pp. 195–197, 3 figs., 2 refs. Helsinki, 1952.

In the summer of 1951, unusually severe injury by *Chermes* (*Sacchiphantes*) *abietis* L. was observed in a stand of spruce 15 years old in southern Finland, the galls having killed about a quarter of 1,000 infested shoots examined. In no case had the terminal shoots been killed, but some were so injured that malformation was inevitable.

NUORTEVA (P.). **Die Bedeutung mechanischer Schädigung des Weizenkorns durch Wanzen für das Korn und für die Backfähigkeit des Mehles.** [The Significance of mechanical Injury to Wheat Grains by Bugs for the Grains and for the Baking Quality of the Flour.]—*Ann. ent. fenn.* **19** no. 1 pp. 29–33, 6 figs., 9 refs. Helsinki, 1953. (With a Summary in English.)

In investigations in Finland in 1952 on the significance of the mechanical injury caused by the feeding of cereal bugs on wheat grains, grains of summer wheat in the stages of milky and yellow ripeness were punctured with a needle in August and harvested in mid-September. The injury then resembled that on grains attacked by the bugs, except that there was no white patch surrounding the puncture. This was produced in some of the artificial wounds by treatment with papain or pepsin solution, but not by human saliva. When the punctured grains were mixed 1 : 5 with normal wheat and ground, the baking quality of the flour was not affected, so that the deterioration caused by the bugs is probably due to the injection of proteolytic enzymes [*cf. R.A.E.*, A **32** 160].

Veenenbos (J. A. J.). **Bestrijdingsproeven tegen enkele voor koolzaad schadelijke insecten.** [Experiments on the Control of certain Insects injurious to Rape.]—*Tijdschr. PlZiekt.* **59** pt. 2 pp. 35–50, 6 figs. Wageningen, 1953. (With a Summary in English.)

The cultivation of rape in Holland has declined considerably since 1950, partly as a result of damage to the crop by insects, particularly *Psylliodes chrysocephala* (L.), the larvae of which bore in the leaf-stalks during autumn and winter, and *Ceuthorrhynchus assimilis* (Payk.), of which the larvae feed on the seeds, and field experiments on the control of these two pests were therefore carried out in several localities in 1950–52. The results are recorded in detail and showed that, in emulsion sprays, DDT was more effective against the adults of *P. chrysocephala* than parathion or BHC and that 2–3 applications at nearly 8 oz. technical DDT per acre, at intervals of 7–10 days, beginning in September when the plants had formed 2–4 leaves, severely reduced subsequent infestation. The larvae in the stalks were killed by sprays of parathion in October but were little affected by spraying with Systox [O,O-diethyl O-2-(ethylmercapto)ethyl thiophosphate] or Pestox [schradan]. Sprays of parathion or BHC killed many larvae even in April, but no increase in yield resulted from treatment at that time. The tests against *C. assimilis* were carried out in May, when the plants began to flower. Good results were given by an emulsifiable preparation of BHC and dieldrin, but BHC alone and toxaphene were less effective and parathion disappointing. *Dasyneura brassicae* (Winn.) was restricted almost exclusively to pods that were or had been infested by *C. assimilis* and can thus be controlled by measures against the weevil. Sprays of parathion against the young larvae in the pods were ineffective.

Hurpin (B.) & Maillard (J.). **Remarques sur la biologie d'***Amphimallon solstitialis* **L. (Col. Scarabaeidae).**—*Bull. Soc. ent. Fr.* **57** no. 4 pp. 58–60, 8 refs. Paris, 1952.

Couturier (A.). *Hyperecteina longicornis* **Fall. (Dipt. Tachinidae) parasite nouveau d'***Amphimallon solstitialis* **L.**—*T.c.* pp. 61–64, 1 fig., 11 refs.

In the first of these papers, the authors record observations on the flight habits of *Amphimallon solstitiale* (L.) to the north of Rouen in the summer of 1951. The beetles were not observed to feed, but damage to various trees, including plum and peach, was severe during the time when they were present. Some of the females were found to be parasitised by *Hyperecteina longicornis* (Fall.), a Tachinid not previously known in France.

In the second paper, it is stated that *H. longicornis* was also found parasitising *A. solstitiale* at Colmar, in Alsace, in 1951. It was identified by Mesnil, and it is pointed out that *Latigena* [of which it is the genotype] and *Centeter* [*cf.* next abstract] are congeneric with *Hyperecteina*. Observations on its habits showed that the eggs are laid on the abdomen of the females while these are being fertilised by the males, and 75 per cent. of the females were found to be parasitised. Up to five eggs were found on a single host at the end of the flight period, but only one parasite per host completed its development. The parasite larvae hatched in 48 hours and entered the body of the female, and parasitised individuals survived for about a week and oviposited. The parasites pupated in the soil 5–6 days after the death of the host and overwintered. In the laboratory, females were preferred to males for oviposition, and *Melolontha melolontha* (L.) to *A. solstitiale*. Parasitised females of *A. solstitiale* laid an average of 15·3 eggs each, as compared with 34·5 for normal females.

Mesnil (L. P.). **Note synonymique.**—*Bull. Soc. ent. Fr.* **58** no. 4 p. 50. Paris, 1953.

The author agrees with Villeneuve that *Centeter* is not generically distinct from *Hyperecteina* and proposes the new name *H. aldrichi* for *H.* (*C.*) *cinerea* (Aldr.) nec *H. cinerea* (Perris).

Ferrière (C.). **Parasites de** *Lyonetia clerckella* **en Valais (Hym. Chalcidoidea).**—*Mitt. schweiz. ent. Ges.* **25** pt. 1 pp. 29–40, 8 figs., 7 refs. Berne, 1952.

Preliminary results of a study of the parasites reared in 1951 from fallen leaves collected under apple trees that had been heavily infested by *Lyonetia clerkella* (L.) at Vex in the Swiss canton of Valais have already been noticed [*R.A.E.*, A **41** 229], though the canton was erroneously cited as Vaud. Following further study of the material, the author gives a revised list of the 11 species concerned showing their relative frequency, followed by descriptions of the six most numerous and notes on the host range and distribution of some of them. The six, in order of decreasing frequency, are the Eulophids, *Zagrammosoma* (*Atoposoma*) *variegatum* (Masi) (previously referred to as *Cirrospilus* sp. near *vittatus* Wlk.), *Tetrastichus xanthops* (Ratz.), *Omphale scutellatus*, sp. n., *Achrysocharis lyonetiae*, sp. n., *Chrysocharis niveipes* (Thoms.) and *C. aeneiscapus* (Thoms.). *Cirrospilus vittatus* is probably an occasional parasite of *Lyonetia* in Switzerland, since examples of it were reared from mined apple leaves collected near Lausanne in November 1951.

Geier (P.) & Baggiolini (M.). *Malacocoris chlorizans* **Pz. (Hem. Het. Mirid.), prédateur des Acariens phytophages.**—*Mitt. schweiz. ent. Ges.* **25** pt. 3 pp. 257–259, 4 figs. Berne, 1952.

Phytophagous mites, particularly *Paratetranychus pilosus* (C. & F.) (*Metatetranychus ulmi*, auct.), *Tetranychus telarius* (L.) (*urticae* Koch) and *Bryobia praetiosa* Koch are important pests of fruit trees in Switzerland and have increased in numbers following the use of insecticides that kill their natural enemies [*cf. R.A.E.*, A **41** 180]. The principal predator present in orchards near Lake Geneva in 1942 was the Mirid, *Malacocoris chlorizans* (Panz.), the adults and nymphs of which attack all stages of these mites. They are also predacious on *T. tiliarius* (Herm.) (*telarius*, auct.) on lime [*Tilia*] and the green apple Aphid, *Aphis pomi* Deg., although it is doubtful whether the species can maintain itself on the Aphid alone. Observations showed that *M. chlorizans* had two generations a year. Eggs were present from September to April and in July, nymphs in May–June and August, and adults principally from mid-June to mid-July and mid-August to mid-September. Winter eggs were laid on the bark, and summer ones on the lower surfaces of the leaves. The adults flew readily, but were less active than the nymphs. *P. pilosus* was particularly attacked and was almost eliminated from the trees under observation. The Mirid was very sensitive to contact insecticides, especially DDT, and disappeared completely from areas treated with it.

Baggiolini (M.). **Un nouveau parasite de la tordeuse orientale du pêcher** (*Laspeyresia molesta* **Busk.): *Lissonota buolianae* Hart. (Hym. Ichn.).**—*Mitt. schweiz. ent. Ges.* **25** pt. 3 pp. 260–262, 2 figs. Berne, 1952.

Cydia (*Laspeyresia*) *molesta* (Busck) was first reported in Switzerland in 1937 in the Ticino and shortly afterwards in Vaud [*cf. R.A.E.*, A **26** 163],

but it remained of little importance until 1950, when, probably as a result of more extensive cultivation, medium and late varieties of peach were heavily infested. Investigations were begun in 1951, and larvae taken in trap bands in the winter in Vaud were found to be parasitised to the extent of 82 per cent. by the Ichneumonid, *Lissonota buolianae* Htg., which is known as a parasite of the indigenous Tortricid, *Rhyacionia* (*Evetria*) *buoliana* (Schiff.), on pine, and has not previously been recorded from *C. molesta*. Infestation in the orchard concerned was considerably reduced in 1952, whereas in the Ticino, from which the parasite was absent, the percentage of late peaches infested rose from 30 in 1951 to 44 in 1952. The parasite was not reared from summer larvae, although the adults were on the wing just before the spring flight of *C. molesta*.

Back (R. C.). **The insecticidal Activity of the Eta Isomer of 1,2,3,4,5,6-Hexachlorocyclohexane.**—*Contr. Boyce Thompson Inst.* **16** no. 10 pp. 451–454, 6 refs. Menasha, Wis., 1952.

Tests in which the newly discovered η isomer of BHC was compared with other isomers of this compound and several representative insecticides for the control of four insects showed it to have no practical insecticidal value; it was about as active as α and δ BHC.

Papers noticed by Title only.

Hornstein (I.). **Report on Benzene Hexachloride** [methods for determining γ isomer in technical BHC and BHC formulations].—*J. Ass. off. agric. Chem.* **36** no. 2 pp. 367–369, 7 refs. Washington, D.C., 1953. [*Cf. R.A.E.*, A **41** 96.]

Giang (P. A.). **Report on Parathion** [methods of determination].—*J. Ass. off. agric. Chem.* **36** no. 2 pp. 384–387, 5 refs. Washington, D.C., 1953. [*Cf. R.A.E.*, A **41** 96.]

Konecky (M. S.). **Report on Allethrin** [methods of analysis of technical allethrin].—*J. Ass. off. agric. Chem.* **36** no. 2 pp. 388–390, 3 refs. Washington, D.C., 1953. [*See R.A.E.*, B **42** 28.]

Nunberg (M.). **Klucz do oznaczania ważniejszych szkodliwych owadów leśnych.** [Key for the Identification of the most important Insect Pests of Forests.]—2nd edn., 7 × $4\frac{3}{4}$ ins., 314 pp., 359 figs. Warsaw, Inst. Badawczy Leśn., 1951. [*Cf. R.A.E.*, A **24** 403.]

Vappula (N. A.). **Finnish Entomological Literature published in 1951 including** [titles of papers on] **Economic Entomology and Control of Insect Pests.**—*Ann. ent. fenn.* **19** no. 1a 18 pp. Helsinki, 1953. [*Cf. R.A.E.*, A **40** 360.]

Wigglesworth (V. B.). **The Principles of Insect Physiology.**—5th edn., revd., 10 × $6\frac{1}{4}$ ins., viii + 546 pp., 355 figs., many refs. London, Methuen & Co. Ltd.; New York, E. P. Dutton & Co. Inc., 1953. Price £2 2*s*. [*Cf. R.A.E.*, A **27** 436.]

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